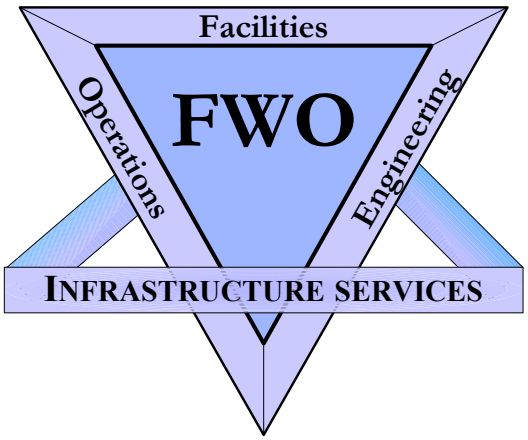
LA-UR-01-2302
Approved for public release, distribution unlimited.



Green Zia Environmental Excellence Program

Achievement-level Application:

Los Alamos National Laboratory

Facility & Waste Operations Division

May 11, 2001

Compiled by Drusilla Price
PO Box 1663, MS P957
Los Alamos, NM 87545
(505) 667-4380

Green Zia Environmental Excellence Program

Application Cover Form

Company: Facility & Waste Operations Division

Address: c/o Environmental Stewardship Office, Los Alamos National Laboratory, Mail Stop J591

Los Alamos, New Mexico 87545 **(Street Name, PO Box, or Apt #)**

(City, State, and Zip Code)

Primary Contact (for questions on application):

Alicia L. Hale

Work Number: 505-667-6711 **Fax #** 505-665-8118

E-Mail Address: ahale@lanl.gov

Level of award or recognition you are applying for:

- ☐ **Commitment Recognition Level**
- ☒ **Achievement Recognition**
- ☐ **Environmental Excellence Award Level**

Have you won a Green Zia Recognition in the past? What level?

No

Please submit seven (7) copies of your application to the address below. Applications must be received by 5:00 pm, Friday, May 11, 2001. Copies may also be emailed at the address below. Please submit check to cover applicable application fee (see program guidance for more information) with the application (please note that checks are made to NMSU, while applications should be addressed to NMED). Check and application can be submitted together.

Purchase orders or checks for application fees should be made out to NMSU/WERC. Please call Chris Campbell at 505-843-4251 for tax id numbers, vendor numbers, etc.

The applications must be sent to the following address:

Patricia Gallagher
Green Zia Environmental Excellence Program
Office of the Secretary
New Mexico Environment Department
PO Box 26110
1190 St. Francis Drive
Santa Fe, NM 87502

Green Zia Environmental Excellence Program
Achievement-level Application:
Los Alamos National Laboratory
Facility & Waste Operations Division

TABLE OF CONTENTS

Acronyms

BUS	Business Operations Division
CAB	Citizens Advisory Board
CSS	Customer Service Satisfaction
DOE	Department of Energy
E2	Energy Efficiency
EPA	Environmental Protection Agency
ESH	Environment, Safety, and Health (Division)
ES&H	environment, safety, and health
ESO	Environmental Stewardship Office
F&IB	Feedback & Improvement Board
FMU	Facility Management Unit
FWO	Facility & Waste Operations
HERCULES	High Efficiency Radiation Counters for Ultimate Low Emission Sensitivity
HOV	High Occupancy Vehicle
HR	Human Resources (Division)
IMP	Integrated Management Program
IPO	Individual Performance Objective
IPS	Integrated Planning and Scheduling
ISM	Integrated Safety Management
ISSM	Integrated Security & Safeguards Management
ITRACK	Issues Tracking System
JCNNM	Johnson Controls Northern New Mexico
LAAO	Los Alamos Area Office (DOE)
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LIG	Laboratory Implementation Guidance
LIR	Laboratory Implementation Requirement
LLW	low-level waste
LPR	Laboratory Performance Requirement
LRAD	Long-range Alpha Detector
LWC	Lost Workday Cases
MLLW	mixed low-level waste
MRF	Material Recycling Facility
MSDS	Material Safety Data Sheet
NCR	non-compliance reporting
NMED	New Mexico Environment Department
P2	Pollution prevention

PDCA	Plan-Do-Check-Act
PPE	personal protective equipment
QPR	Quarterly Performance Review
RCA	Radiological Controlled Area
RLWTR	Radioactive Liquid Waste Treatment Facility
SBO	Small Business Office
SCP	Safety Concern Program
SWO	Solid Waste Operations (FWO)
TA	Technical Area
TRI	Total Recordable Incidents
TRU	Transuranic
TSDF	Treatment Storage and Disposal Facilities
TWISP	Transuranic Waste Inspectible Storage
UC	University of California
UI	Utilities & Infrastructure (FWO)
VoC	Voice of the Customer
WAND	Water Assay for Nonradioactive Disposal
WFM/RLW	Waste Facility Management/Radioactive Liquid Waste (FWO)
WIPP	Waste Isolation Pilot Plant
WMC	Waste Management Coordinator
WMPPC	Waste Management Policy and Procedure Council

Green Zia Environmental Excellence Program
Achievement-level Application:
Los Alamos National Laboratory
Facility & Waste Operations Division

Organizational Overview

0.1 Basic Organizational Description

Los Alamos National Laboratory (LANL) is owned by the U.S. Department of Energy (DOE) and operated under contract by the University of California (UC). Established in 1943 as part of the Manhattan Project, LANL's original mission was to design, develop, and test nuclear weapons. As technologies, U.S. priorities, and the world community have changed, LANL's mission has broadened to enhancing global security by ensuring safety and confidence in the U.S. nuclear weapons stockpile, developing technical solutions to reduce the threat of weapons of mass destruction and non-proliferation issues to improving the environmental and waste legacies of the Cold War. In addition, LANL applies its scientific and engineering capabilities to assist the nation in addressing energy, environment, infrastructure, and biological security problems.

LANL occupies a site encompassing 50 different work areas spread across 43 square miles and housing a workforce of ~10,000 (including both UC and subcontract workers). It includes ~2,300 buildings totaling ~8.1 million square feet. LANL is composed of ~30 major organizations, called divisions, including the Facility & Waste Operations (FWO) Division. Each division has a director, deputy director, group leaders, and team leaders. FWO Division is two years young. When FWO was formed, the facility and waste operations divisions were merged into one division to better serve the institution, customers, and stakeholders.

During these two years, FWO has focused on establishing its management team, aggressively creating and/or enhancing processes to ensure compliance, while still meeting customers' needs and expectations, and assuming additional institutional functions, i.e., facility authorization basis and decontaminating/decommissioning projects. FWO Division is organized into groups managed by group leaders (see Figure 0-1). Each is subdivided into teams based on the products and/or services provided. The group leaders guide the team leaders regarding what actions or objectives must be accomplished. Each team and individual then exercises good judgment and creativity within the confines of policies and standards to determine the most effective way to accomplish assigned work. While FWO Division and all of its groups/employees participate in pollution prevention (P2) and energy efficiency (E2) conservation efforts, four groups play particularly active roles in these endeavors. They are the Diversified Facilities (DF), Solid Waste Operations (SWO), Utilities and Infrastructure (UI), and Waste Facility Management/Radioactive Liquid Waste (WFM/RLW) Groups.

The Division homepage is available at http://www.lanl.gov/worldview/organization/profiles/fwo_profile.html.

FWO Division provides both routine and specialized facilities- and waste-related products and services that are centrally managed and provided throughout the site either from a central location or at remote locations as determined by the needs of our customers. We categorize our products and services into

- authorization basis;
- decommissioning;
- diversified facilities;
- fire protection;
- facility management services;
- integrated information management;
- radioactive liquid waste;
- solid waste operations;
- systems, engineering and maintenance; and
- support services contract management.

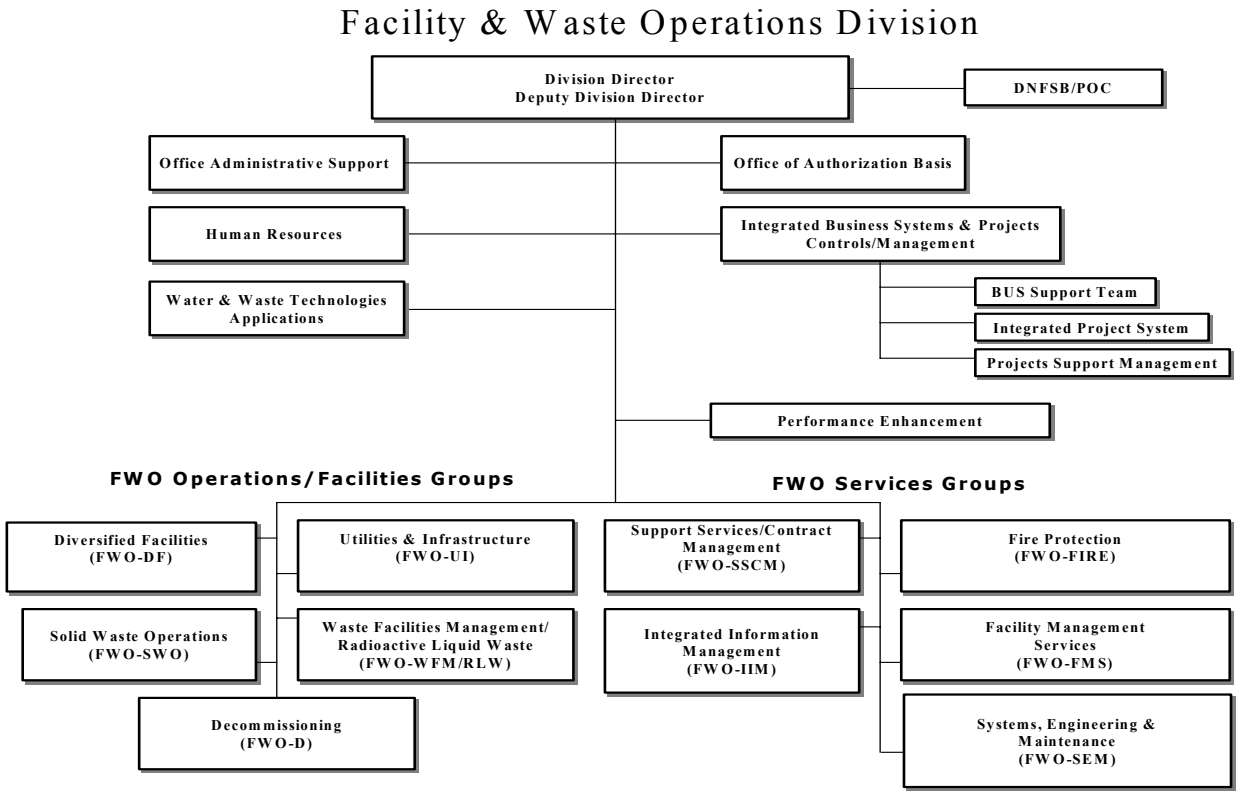


Figure 0-1. *FWO Division organizational chart.*

FWO operates five facility management units (FMUs) for LANL, which provides services in support of LANL assets that range from roads, grounds, and administrative buildings to three nuclear (Category II and III and radiological) waste treatment, storage, and disposal facilities. FWO Division enables LANL to achieve its mission by providing products and services through these key business processes (see Figure 0-2).

LANL is the sole market for these services, although we provide significant facility services and waste operations expertise freely as requested by neighboring communities and the State of New Mexico.

Overall LANL funding for FY00 was $1.56 billion. The FY00 budget for FWO Division was $141 million, or ~ 9% of LANL's total funding.

FWO Division's mission (see Figure 0-3) supports LANL's mission by continually improving, managing, and evaluating its operational performance. FWO Division's organizational culture also includes a clearly articulated vision (see Figure 0-4). Both the mission and vision focus on customers, efficient and effective operations, and a safe work environment.

In FY00 UC employed approximately 7,000 regular, full-time workers. FWO Division has 261 employees (69% UC employees and 31% contract workers), which is roughly 0.3% of the UC workforce. Figure 0-5 shows the overall FWO Division workforce composition, and Figure 0-6 shows the distribution of the workforce across the waste and support (facility and operations) processes. The FWO Division workforce is composed of 33.5% female employees and 66.5% male employees. Educational levels are

- 31.7% Bachelors Degree
- 19.7% Masters Degree
- 9.3% Associate Degree
- 2.7% Ph.D.
- 36.6% No College

Most of the employees have either training or experience in operating a large industrial complex that deals with many hazardous materials in a highly regulated environment.

Business Results Area	Products and Services	Key Processes
Facility Management Leadership	• Lab-wide requirements for operations and maintenance of facilities • Space management • Engineering services • Fire protection • Contracts oversight	Facility technical and maintenance standards and requirements; facility measures and performance; facility services
Facility Management	• Operation and maintenance of administrative buildings • Roads and grounds planning • Maintenance • Utilities delivery	Facility management services; infrastructure management and services; utility delivery
Business Systems	• Support services (environment, safety, and health; training; budget; integrated planning and scheduling); quarterly quality performance reviews; customer satisfaction • Information services	Business planning; financial management, personnel management; work management
Waste Management Systems	• Chemical and hazardous/mixed waste storage and disposal • Solid low-level radioactive waste disposal • Liquid radioactive waste treatment • Transuranic waste storage and volume reduction • Waste certification • Waste characterization services • Waste minimization processes/technologies • Waste Management Coordinator services • Sanitary waste recycling	Waste management; waste characterization and certification; waste volume planning and reduction; waste services

Figure 0-2. *FWO Division categorizes products and services and key processes into business results areas.*

Los Alamos National Laboratory Mission
Reduce the global nuclear danger

FWO Division Mission
The Facility & Waste Operations Division is a multi-discipline division whose primary mission is to provide support services to the Laboratory's infrastructure requirements in order to enhance the Laboratory's ability to accomplish its objective.

Figure 0-3. *The FWO Division mission supports LANL's mission.*

FWO Division Vision
To develop, manage, and maintain LANL facilities, utilities, and grounds in accordance with LANL's mission. To conduct all operations and support activities such that the risks (to the employees, the public, the environment) are minimized and managed.

Figure 0-4. *The FWO Division vision.*

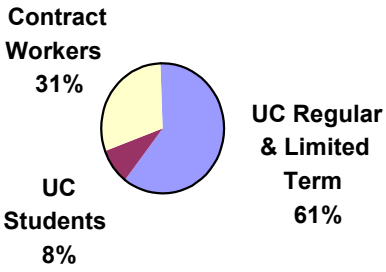


Figure 0-5. *FWO Division workforce composition.*

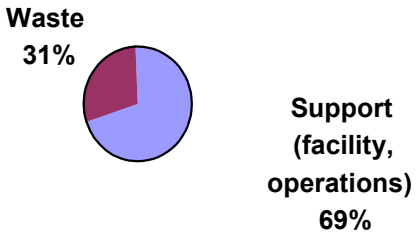


Figure 0-6. *FWO Division distribution of workforce.*

The Laboratory deals with numerous hazards that range from normal office concerns to industrial issues to dangerous radioactive and chemical materials. Numerous organizations regulate or oversee Laboratory operations, such as:

- Defense Nuclear Facilities Safety Board (nuclear);
- DOE (full scope oversight including nuclear and industrial);
- Environmental Protection Agency (EPA) (air and water);
- New Mexico Environmental Department (NMED) (hazardous waste); and
- State of New Mexico (Water Quality Control Commission).

In addition, numerous public organizations such as the local governmental bodies of Los Alamos, Espanola, and Santa Fe, the eight Northern Pueblos, and various environmental groups such as the Forest Guardians and the Sierra Club observe and comment on Laboratory activities and are important stakeholders.

The Laboratory conducts its business in a careful and disciplined fashion to meet its safety and environmental responsibilities. The focus on safety is particularly important for FWO Division and is part of our business strategy.

FWO, as well as the rest of the Laboratory, is actively working to reduce the impact that environmental, safety, and health (ES&H) regulations and oversight have on cost and productivity while adhering to stringent standards for safety and security. The number of regulations that dictate how FWO performs its work is increasing geometrically, but FWO is striving to go beyond simply meeting compliance requirements.

FWO's P2/E2 conservation efforts have garnered recognition for

- Ship to Waste Isolation Pilot Plant (WIPP) Project Team - LANL Distinguished Performance Award
- Environmental Management Certificate of Technology Innovation – DOE/Albuquerque
- Savings Achievement in the Department of Defense Direct Supply Natural Gas Program
- Exemplifying Environmental Safety in the Boiler Program – LANL Achievement Award

In addition to regulatory expectations, LANL operations (including FWO Division) performance measures are shaped and evaluated by contractual requirements negotiated by DOE, UC, and LANL. These requirements, revised annually, are contained in Appendix F of the operating contract and provide a broad range of specific goals, measures, and evaluation criteria. Appendix F serves as a key method of determining both customer expectations and organizational performance. The Appendix explicitly calls out as a scoring criterion the application of Green Zia tools to identify P2/E2 opportunities (Sec. I-2, 1.2.c.1, Waste Minimization, Affirmative Procurement, and Energy and Natural Resources Conservation).

In addition, DOE and UC evaluate overall LANL performance to which FWO Division contributes on other environmental components of Appendix F. Item 3.1 provides a more comprehensive explanation of the Appendix F process.

0.2 Customer and Interested Party Requirements

The DOE, for whom UC operates LANL, is the ultimate customer for FWO Division. All products and services are designed, either directly or indirectly, to carry out that portion of DOE's mission assigned to the Laboratory. The division has identified the following broad groups of customers:

- division and contractor employees,
- facility management community,
- internal/external consumers of FWO services, and
- the public, surrounding communities, and interested constituents.

FWO Division's customers and stakeholders span the spectrum shown in Figure 0-7. The Division uses an ongoing pro??cess to assess and update our understanding of our customers' expectations. We have learned that our clients expect us to provide our products and services in an increasingly cost-effective and efficient manner while adding new services as their missions demand. The DOE frequently prescribes in what manner our products and services are to be delivered. Each group of customers has a specific set of environmental expectations for FWO Division. Those expectations also include a general commitment to safe operations, including ergonomics, and efforts to minimize sanitary waste generation and consumption of resources.

Customer Segment	KEY ENVIRONMENTAL REQUIREMENTS	DETERMINED BY
Division and Contractor Employees	• Provide a safe and healthy work environment • Help LANL meet key environmental goals	• Appendix F • LANL Goals • Safety regulations and requirements
DOE, Technical Programs and Support Divisions within LANL	• Use good business practices (cost effective, efficient, timely, productive) • Help LANL meet key environmental goals	• Appendix F • LANL Goals • Internal Oversight
Stakeholders (UC, the general public)	• Use good business practices (cost effective, efficient, timely, productive) • Remain compliant with all regulatory standards	• Appendix F • DOE Orders • External Oversight

Figure 0-7. *FWO Division key customer segments and requirements related to environment.*

In addition to the measures included in Appendix F, FWO Division uses a variety of LANL institutional systems to structure division operations. LANL's Integrated Safety Management (ISM) Program, in its broadest definition, serves as a basis for the institution's environmental management system (see Item 1.1). LANL's Performance Management System (see Item 5.1) helps leaders establish clear performance expectations for employees and ensures those expectations are aligned with organizational goals and values.

LANL mechanisms such as the annual Employee Checkpoint Survey (see Item 3.1) and the Upward Appraisal Program (see Item 5.2) also allow FWO Division leaders to evaluate customer/stakeholder satisfaction with division performance. FWO participated in these mechanisms in 1999; unfortunately, due to the May 2000 Cerro Grande fire, they were not conducted last year.

Other methods utilized by FWO to capture customer expectations include the Voice of the Customer (VoC) Program. This program consists of VoC interviews, data capture, analysis, action plan development, and implementing corrective actions. Follow-up interviews occur with the previously interviewed participants to assess if they perceive changes. FWO also has a Customer Service Satisfaction (CSS) Program that gathers data from its customers. Another method to capture and assess/analyze customer input is via the Customer Feedback Form that resides on each FWO Group Web Homepage. The customers have the option to identify themselves or remain anonymous. FWO also sends out hard copy customer feedback forms for data capture, analysis, and process improvements.

0.3 Supplier and P2/E2 Partnering Relationships

FWO Division expends approximately $63.5 million annually with suppliers and partners, so this aspect of our business is particularly important. FWO has technical oversight for Johnson Controls Northern New Mexico (JCNNM). JCNNM is the largest supplier and operates under a contract that integrates it into the Laboratory's activities. JCNNM shares our objectives and achieves remuneration largely based upon objective performance measures. JCNNM consistently endeavors to reduce pollution and implement programs and processes to enhance energy efficiencies and conservation, i.e., low-energy consumption lamps, LANL-wide recycling program implementation, reduction in waste streams, reducing hazardous waste, etc.

The FWO-SWO Group partners with contractors to identify potential hazards, controls, and any special monitoring required to ensure a safe, environmentally friendly site. The subcontractor employees are on-site and interact with SWO staff daily. They attend and participate in the SWO Plan of the Day meetings to discuss daily tasks, lessons learned, continuous quality improvements, and P2/E2. The Los Alamos County landfill teams with SWO in operating the LANL-wide cardboard recycle program.

Our largest supplier group is for utilities. In this case, we partner with Los Alamos County and the DOE to purchase water, natural gas, and electricity. Our final major group of suppliers consists of other internal Laboratory organizations. We purchase financial; training; computing; communications; ES&H, and numerous other services that are necessary to conduct our business.

Because the key suppliers' performance directly affects the division and the entire Laboratory, quality expectations and performance requirements are clearly communicated. FWO Division representatives meet frequently and regularly with supplier representatives to evaluate performance and provide systematic, detailed feedback.

0.4 Competitive Situation

There are a number of competitive factors that create challenges for the providers of facilities and waste management services in this market:

- *Knowledge of the Laboratory infrastructure and equipment.* In particular, the Laboratory has a significant amount of old equipment such as chillers and boilers that we have maintained for years past their predicted lives and often well past the existence of the manufacturer. Replacement equipment addresses modernization, energy conservation including low air emissions, environmentally friendly, recycled content, etc.
- *Understanding of the stakeholder requirements.* The DOE Orders that have governed the provision to the facility engineering products and services are complex and frequently more demanding than industry standards, particularly in the area of nuclear facilities.
- *Experience providing services according to best business practices.* Providers who have worked with private industry have a significant advantage in terms of knowing the state-of-the-art practices that result in large improvements in facility and waste management.
- *Cost/Utility Reduction Initiatives.* Pressure remains intense to provide facility products and services as cost effectively and energy efficiently as possible.

0.5 Strategic Context

As the DOE continues to collapse and consolidate the weapons complex into a few centers of excellence, the aging physical plant at Los Alamos must continue to function for today's experimental needs and adapt to the additional demands of new science, technology, and production. Expertise in retrofitting and maintaining old structures to meet modern standards is essential to the success of the Laboratory. Whenever feasible during retrofitting, replacement, and maintenance activities, waste minimization techniques and processes are applied and energy conservation, and environmentally friendly products are utilized.

Our contract emphasis on economic development of Northern New Mexico compels us to analyze the impact of our contracting activities on the economy of the region and to look for opportunities to encourage new business development. The public also expects us to demonstrate our corporate citizenship through supporting local communities with scholarships, charitable contributions, and technical assistance. In December 2000, FWO was presented the first LANL Eagle Award from the Small Business Office for the willingness and financial support for subcontracting with small business suppliers from Northern New Mexico.

Finally, we must continue to develop our workforce to satisfy the evolving needs of our customers and the changing environment. To do this, we must keep abreast of our customers' requirements, anticipate the skills and expertise needed, and redirect or redevelop our workforce to match these changing demands. Indeed, we must move beyond meeting current customer needs by preparing our employees for the challenges of the future workplace.

Recent improvements to the institutional ISM System (see Item 1.1) also allow all LANL units, including FWO Division, to provide input to the Laboratory's identification of most significant environmental issues. Similarly, the ISM system allows key institutional issues related to the environment to become the focus of all work units, including FWO Division.

FWO Division has focused on several environmental thrusts that have been implemented across LANL (see Item 6.2.). These are:

- Empty Drum Reconditioning,
- Green is Clean,
  - High Efficiency Radiation Counters for Ultimate Low Emission Sensitivity (HERCULES),
  - Long-range Alpha Detector (LRAD),
  - Waste Assay for Nonradioactive Disposal (WAND),
- High Occupancy Vehicle (HOV),
- Material Recycling Facility (MRF),
- Mixed Low-level Waste (MLLW) Avoidance Programs (three),
- Quality of Waters Discharged and various waste minimization projects, and
- Transuranic (TRU) Waste Inspectible Storage (TWISP).

Although FWO Division is two years young, it uses the Baldrige structure and process to improve what we do and how we deliver our products. The purpose of this document is to describe our progress to date and assist us in highlighting areas for ongoing improvement.

1 Leadership

1.1 Organizational Leadership

The leadership system that supports environmental excellence in FWO Division begins with the director of LANL who, in 1998, issued a vision for LANL that included zero environmental incidents. Figure 1-1 shows the "six zeros" which constitute LANL's highest level goals. A comprehensive, proactive, ethics-based system cascades down from these leadership goals.

Zero Injuries or Illness on the Job
Zero Injuries or Illness off the Job
Zero Environmental Incidents
Zero Ethics Incidents
Zero People Mistreatment Incidents
Zero Security and Safeguards Incidents

Figure 1-1. *LANL's "six zeros" goals.*

The FWO division director and deputy, 11 group leaders, and three deputy group leaders make up the division's leadership team. Management sustains effective leadership throughout the division by providing

- an infrastructure that is reliable, safe, and cost-effective that includes utilities (gas, steam, electrical, water, and wastewater), roads, grounds, energy management, surface drainage, and solid waste disposal; and
- an institutional solid waste operations facility, radioactive liquid waste treatment facility, and material recovery facility that are managed and operated to excellent environmental compliance.

Division managers guide the organization by advocating uncompromising safety, by promoting P2/E2 and resource conservation, by modeling corporate citizenship, and by recognizing and rewarding innovation and efficiencies in productivity.

FWO Division has been working to establish both processes and behaviors to achieve zero-waste goals. The system begins with a vision (refer to Figure 0-4) for the organization. FWO Division managers recognize that waste is the result of inefficiency. FWO has developed and implemented various waste minimization and P2/E2 processes which include, at a minimum, Green is Clean with three waste assay instruments (HERCULES, LRAD, and WAND); MRF; TWISP; Empty Drum Reconditioning; MLLW Avoidance Programs (three); various Quality of Waters Discharged and waste minimization projects; energy reduction, and site-wide energy metering program (implementing and installing). (See Item 6.2.)

FWO consistently develops and/or refines communication vehicles to its employees, customers, and stakeholders to aid in achieving the six zero goals. Within the FWO Web Homepage, an ES&H and Security section is maintained and updated with information and/or links to specific topic information. Examples of the main topics are: Orientation to Integrated Safety Management, Laboratory Implementation Requirement (LIR) Training, FWO LIR Applicability Matrix, Issues Tracking System (ITRACK), Metrics, References, Safety & Health Training, Environment, Safety & Health News, FWO FY01 Self-Assessment Plan, Self-Assessments & Lessons Learned, Ergonomics, Material Safety Data Sheets (MSDSs), LANL LIRs, Laboratory Implementation Guidance (LIGs), Laboratory Performance Requirements (LPRs), FWO ISM Description Plan, Integrated Security & Safeguards Management (ISSM), FWO Security Concerns, Security & Safeguards Homepage, FWO Contacts, FWO ISSM Description Plan, FWO Student Page, ES&H/Security & Safeguards Comments/Suggestions, and Performance Enhancement.

An integrating framework that FWO Division and LANL overall use as an environmental management system is ISM. The broad definition of “safety” encompasses all aspects of ES&H policy, including P2/E2 and waste minimization (see Figure 1-2). ISM implementation is a major emphasis at LANL, and senior leaders formally review progress toward full implementation on a quarterly basis.

To further complement ISM and ISSM, FWO developed and implemented an Integrated Management Program (IMP). This IMP integrates and ties directly to quality, safety, and security and safeguards goals, objectives, and the overall LANL ISM and ISSM plans. FWO managers have shared and discussed the IMP with their employees. FWO managers will review the IMP annually and revise as necessary.

Figure 1-2. *LANL's five-step process for ISM.*

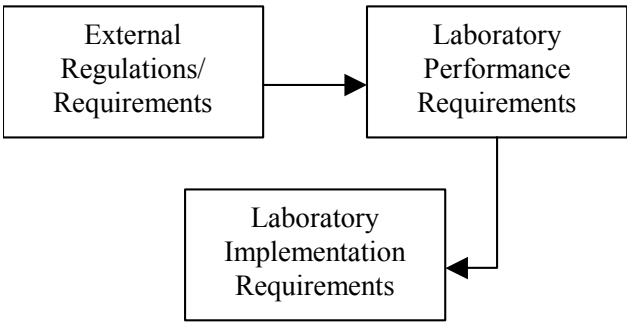


Figure 1-3. *Translation of legal requirements into LANL performance standards.*

The ISM system includes LPRs, internal requirements governing the performance of work that are drawn directly from legal or contractual regulations (see Figure 1-3). LANL has grouped the LPRs into six categories, including worker health and safety and environmental protection. LIRs stem directly from the LPRs and provide detailed mandatory implementing requirements for the safe and environmentally responsible performance of work (see Figure 1-4). To ensure that all division employees understand LPR/LIR guidelines and performance requirements, FWO has them clearly identified on the FWO ES&H Web Homepage. FWO managers discuss the mandatory, function-specific LIRs with their employees; each employee signs a LIR Acknowledgement Form; and the form is forwarded to the Division.

LIR No.	LIR Title	LIR No.	LIR Title
220-03-01	Facility Engineering Manual	402-705-01	Radiological Design and Control Review
230-05-01	Operations & Maintenance Manual	402-716-01	Source Control
250-02-02	Facility-Tenant Agreements	402-720-01	Work Planning
300-00-06.1	Nuclear Facility Safety Authorization Basis	402-880-01	Excavation Permit Review Process
307-01-03	Management Safety Walk-Arounds	404-00-01	Waste Acceptance, Characterization, and Certification Program
307-01-04	Safety Concerns Program	404-00-02	General Waste Management Requirements
402-100-02	Hazardous Waste Operations and Emergency Response Training Requirements	404-00-03	Hazardous and Mixed Waste Requirements for Generators
402-10-03.1	ES&H Management of Contractor Performed Facility Construction/Maintenance, Environmental Restoration/Decontamination and Decommission, and Related Drilling Operations	404-00-04	Managing Solid Waste
402-530-00	Biological Safety	404-00-05	Managing Radioactive Waste
402-560-01.0	Beryllium Use	404-00-06	Managing Polychlorinated Biphenyls
402-570-01.0	Asbestos	404-10-01.1	Air Quality Reviews
402-580-01	Cryogenic Fluids or Cryogens	404-50-01.0	Water Pollution Control
402-704-01	Contamination Control	405-10-01	Packaging and Transportation

Figure 1-4. *Matrix showing FWO Division's environmental management and P2 responsibilities under LANL LIRs.*

FWO Division's management system is based on frequent and open communication. FWO holds weekly management meetings, monthly integrated planning and scheduling (IPS) reviews, quarterly performance reviews (QPRs), and quarterly all-hands meetings. The weekly management meeting minutes are forwarded and shared with employees. The monthly IPS reviews are held with each Group Leader who discuss projects, schedules, timelines, and milestones. Deviations are recorded and the schedule revised as required. All IPS reviews focus on expectations and progress toward goals, as well as ES&H issues. Group Leaders review action plans for relevant projects, including process improvement efforts, to ensure work is being completed as scheduled and budgeted or to determine necessary adjustments to the plans. The FWO Division Director and the IPS Team Leader discuss the monthly review results with every FWO Group.

The quarterly performance reviews focus on the status of the FWO Appendix F Performance Measures. The QPR portrays the progress for each FWO-owned Appendix F measure via presentations, discussions, resolutions, etc. Following the QPR, the Appendix F graphs are displayed on both the FMS and Division Homepages for access.

The all-hands meetings bring the Division employees up-to-date on events (project progress), accomplishments, goals, problems, or special issues. A question and answer session prior to closure is conducted, and the relevant manager and/or subject matter expert responds. Safety is always discussed at these meetings.

Group leaders conduct regular management walk-arounds. These informal but structured reviews allow leaders to observe working conditions throughout their areas of responsibility, to talk informally with employees, and to note potential areas for improvement. LANL has created nine categories of guidance cards, including environmental protection, that provide suggestions on the types of observations managers should make during walk-arounds. Walk-around findings in the environmental category are tracked and analyzed by means of a web-accessible database and are reported to the most senior LANL managers by the Deputy Laboratory Director of Operations. In 2000, FWO Division managers performed ~608 documented walk-arounds.

Information regarding organizational goals and current progress cascades to individual employees through the management structure. In addition to the quarterly all-hands meetings already mentioned, group leaders hold regular meetings with their staff to discuss programmatic issues. FWO Division also maintains a web site with a wide range of detailed available information for employees, customers, and stakeholders. One key part of the web site includes safety resources (see Figure 1-5).

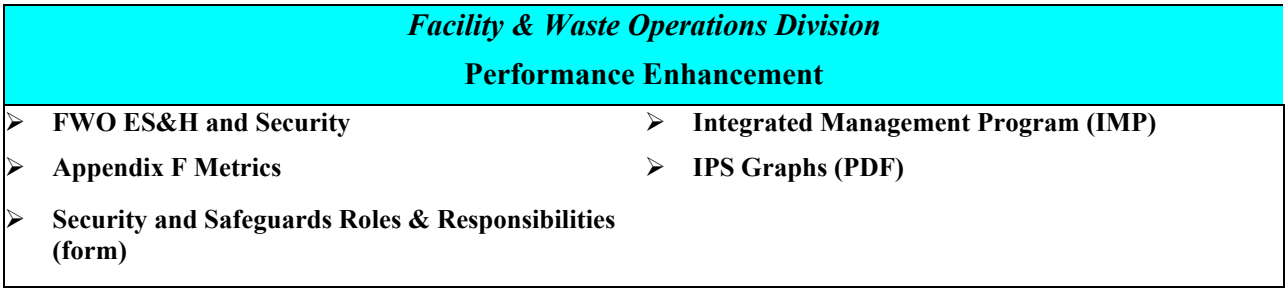


Figure 1-5. *FWO Division Sample Performance Enhancement (safety, security, and safeguards, etc.) web page.*

FWO Division is fully committed to continuous improvement of all its operations. Such improvements usually include, either directly or indirectly, a reduction of waste generation or a decrease in needed resources.

The planning process used by FWO Division managers employs a line-of-sight process from high-level organizational goals to individual performance expectations. Group leaders develop group-level plans to support division goals. Using LANL's Performance Management System (see Item 5.1), managers then work cooperatively with employees to identify how each individual in the program is expected to contribute to the vision. This methodology has become a cornerstone for the operations within FWO Division.

One FWO group that has actively provided organizational leadership is the Diversified Facilities Group, which is the landlord at certain key facilities throughout the Laboratory. DF has formed a Quality Team to coordinate P2/E2 efforts at the Otowi Building. This building houses administrative and operational staff from several organizations, including Human Resources; Computing, Communications, and Networking; Business Operations; and ARAMARK Corporation

(a food service agency). With a total occupancy of 640, the Otowi is one of the Laboratory's main administrative facilities.

As the Otowi physical plant manager, the Quality Team brings together all building tenants to coordinate P2/E2 projects facility-wide, not only in its championing of the Otowi Energy Systems Retrofit, but also in

- site-specific utilities conservation training,
- sanitary waste tracking,
- employee feedback, and
- kitchen grease recycling.

Energy consumption tracking is one component of the Otowi Energy Retrofit being carried out under the FWO-DF Quality Team leadership. Other retrofit components include

- recommissioning of solar panels to supplement the domestic hot water system,
- automated lighting control to reduce after-hours power consumption, and
- ongoing training for employees in circuit-load-friendly power cord and appliance deployment.

1.2 Community Leadership

The nature of our work requires FWO staff to interact extensively with various local, state, and federal governmental agencies. In the aftermath of the Cerro Grande fire and the monumental erosion control, flooding, wildfire (i.e., seeding/mulching, tree felling, etc.) mitigations and rehabilitation work that occurred (June through October), FWO was a pivotal player and partner in the monthly DOE/LAAO Public Meeting Forums. These meetings communicated the prog??ress and rebirth of Los Alamos to the public and addressed concerns and observations.

FWO Division has limited interaction with the public related to environmental issues. Hence, LANL has designated the Community and External Relations Division to routinely handle interactions with the public. Presentations, discussions, and workshops specifically focused on environmental issues are typically coordinated through LANL's ESH Division or the Environmental Science and Waste Technology Division. Other community interactions take place through the many integrated outreach programs of LANL. FWO Division is involved and/or represented in all of these institutional outreach activities.

The Northern New Mexico Citizens' Advisory Board (CAB) is a community advisory group that provides advice and recommendations to the Environmental Management sector of DOE about environmental restoration and waste management at LANL. Members of the CAB seek to understand the complex array of activities, waste types and sources, monitoring and cleanup technologies, regulatory requirements, public perceptions, and political jurisdictions involved in this effort, and then develop recommendations that weave together those factors into something useful to the DOE and LANL. LANL has one ex-officio member of the CAB and provides input and information at each of the monthly meetings held at various locations across Northern New Mexico.

LANL's organizations, including FWO Division, also play a role in one of New Mexico's emerging strategic natural resource protection issues - water resources management. LANL representatives chair and provide technical support to

- Governor's Blue Ribbon Task Force on Water
- Jemez y Sangre Water Planning Council

Executive Order 99-35 established the Blue Ribbon Task Force on Water to investigate current water policies and laws within New Mexico. The Task Force recommends changes to existing policies and laws and proposes new water policies and laws as an outgrowth of long-range planning related to water use in the State.

The Jemez y Sangre Water Planning Council is a regional planning body attempting to secure water supply continuity for future generations. LANL staff chairs the council's monthly meetings and participates on the executive, legal, and technical subcommittees.

The Business Operations (BUS) Division is the LANL entity responsible for interacting with subcontractors and other resource and service providers. Thus, that division reviews and approves all subcontracting plans (including environmental requirements as appropriate) and tracks the performance of LANL contractors in conjunction with ES&H.

A key aspect of LANL procurement, including that of FWO Division, is to support, whenever possible, Northern New Mexico vendors, especially small businesses and those owned by minorities and women. Each year the BUS Division Small Business Office (SBO) establishes socioeconomic goals and Northern New Mexico procurement goals. Whenever possible, FWO Division attempts to purchase materials locally. In December 2000, FWO was presented the first LANL Eagle Award from the Small Business Office for the willingness and financial support for subcontracting with small business suppliers from Northern New Mexico. The SBO also provides guidance to local businesses regarding such matters as establishing proactive P2/E2 programs and using/providing products with recycled content.

FWO Division also contributes to LANL's highly successful environmental initiative (i.e., white paper and Mail Stop A1000). This is an effort to recycle clean white paper, unwanted junk mail, and other printed material. Division employees re-address unwanted mail to Mail Stop A1000, and LANL mail delivery personnel collect and sort the material as part of their normal mailroom activities. In 2000 the program recycled over 245 metric tons of material. This program has received wide publicity both inside and outside LANL and last year received a White House Closing the Circle Award. The Closing the Circle Program, now in its sixth year, recognizes federal employees and their facilities for efforts that result in significant positive impacts on the environment in waste prevention, recycling, affirmative procurement (purchasing recycled products), environmental preferability, model facility demonstrations, and sowing the seeds for change (see Item 0.1).

2 Planning for Continuous Environmental Improvement

2.1 Strategic Planning for Environmental Improvement

LANL has developed and uses as a guiding blueprint the Laboratory Strategic Plan, 1999-2004 (available at http://www.lanl.gov/orgs/pa/News/StrategicPlan99.html). The current LANL strategic plan sets out major programmatic objectives and strategies. It also identifies environmental objectives related to most major LANL goals. In addition, a major objective of demonstrating operational excellence in all activities specifically calls out the following strategies:

- Achieve measurable improvements in safety and environmental stewardship through full implementation of ISM (which includes P2/E2) throughout LANL.
- Manage wastes and hazardous legacy materials effectively and accept the challenge of minimizing the generation of hazardous wastes in the future, with a long-term direction toward zero emissions.

Each year LANL also produces an institutional plan, a five-year perspective on LANL operations. The Institutional Plan FY 1999-FY 2004 (available at http://lib-www.lanl.gov/la-pubs/00418669.pdf) identifies strategic requirements for LANL organizational units, including FWO Division; summarizes strategic, tactical, and programmatic plans; and helps ensure the integration of LANL activities with DOE priorities.

Finally, cross-functional teams of Laboratory employees, experts in subject matters related to environmental performance, meet annually to identify and set priorities for the institution's environmental performance. This process, based loosely on ISO 14001 principles, includes aspect identification and the creation of draft targets and objectives for improvement efforts. This information is then transmitted to the Laboratory's Safety Function Manager for the Environment, who prepares an annual summary of environmental concerns that is transmitted to senior Laboratory management for action. The goals established by this process are then assigned to LANL organizations, as appropriate, for implementation, reporting, and tracking. (Item 6.2 identifies the overall institutional process for environmental improvement.)

In addition, through senior leaders' negotiation and assessments with DOE and UC stakeholders, the CAB, and other vehicles, FWO Division managers get a clear perspective of how stakeholders view them.

Based on LANL strategic directions, identified high-priority environmental improvement goals, and DOE requirements, FWO Division then develops its own goals. The division sets strategic direction by reviewing and/or incorporating the Director's and the Deputy Laboratory Director for Operations' goals into FWO's goals.

FWO utilized the Laboratory Annual Performance Appraisal process in lieu of strategic planning as a foundation of planning to convey FWO's organizational objectives, i.e., ISM/ISSM, Administrative/Management, and Programmatic. The organizational objectives depict FWO's tasks, processes, and programs that set core priorities and reflect what FWO will achieve collectively. To further complement the organizational objectives, Individual Performance Objectives (IPOs) were developed for each employee that were specific, measurable, and achievable and represented a significant portion of their tasks and responsibilities that addressed their group's goals and objectives. Employees committed to the Organization Goals and IPOs and obtained a more comprehensive understanding of the Laboratory's and FWO's goals and plans. Besides the organizational goals and IPOs, FWO also provided development plans for employees. These plans addressed development an employee might need to help achieve objectives. They contained goals, actions, resources, and completion dates.

Now that FWO has its management team selected and in place, the next focus is geared to incorporating quality management tools and methodologies in its day-to-day operations (waste and facility) and future tactics, i.e., strategic planning, development of business plans, data capture, root cause analysis, etc. Every operation will examine existing/future P2/E2 conservation targets.

Participation in the New Mexico Green Zia Environmental Excellence Program, with accompanying development of appropriate measures and performance indicators, is another key element allowing the division to incorporate environmental focus into long-range plans. In 1999, the FWO TWISP won a Green Zia Achievement Award. In 2000, the FWO Diversified Facilities Group won a Green Zia Commitment Award.

2.2 Action Planning

After identifying goals, FWO Division develops actions, targets, and measurements of success, as shown in Figure 2-1. Because managers and employees recognize that inefficiency leads to waste, there is an ongoing effort to improve opera-

tions. Item 6.2 describes the method by which key division processes are analyzed and improved. These improvement efforts include action plans, which are regularly reported to management and tracked for successful completion. The LANL Audits and Assessments Division and management agree on remedial actions, then assign and enter it into ITRACK.

A new focus for FWO is participation in the New Mexico Green Zia Environmental Excellence Program and use of the Green Zia tools for environmental excellence. Submission of this award application is part of an ongoing division effort to more effectively and systematically focus on environmental performance. Additionally, FWO Division's quarterly self-assessment and implementation strategy for ISM focuses on how to involve all employees in making environmental improvement a routine part of all operations. In combination with the leadership systems previously described, these efforts also contribute to the development and execution of action plans.

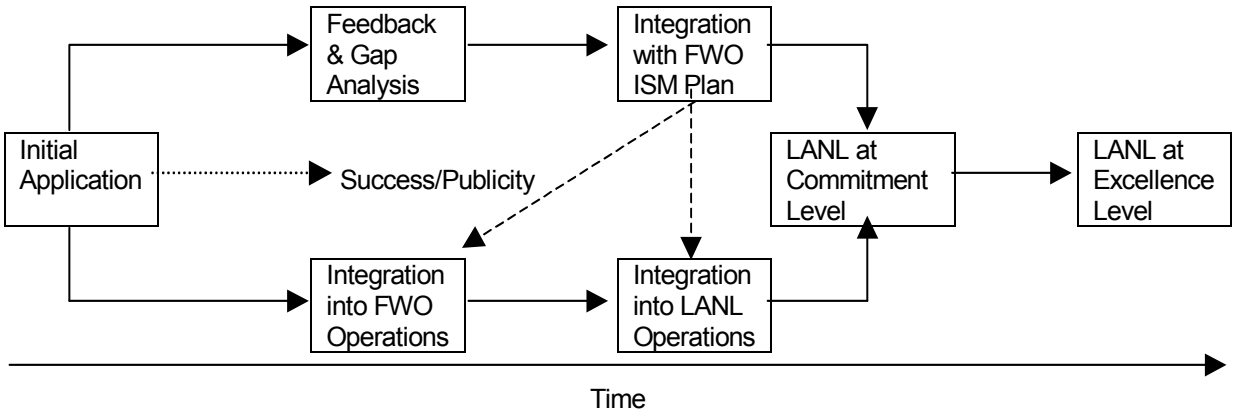


Figure 2-1. *LANL's and FWO Division's Green Zia plans.*

2.3 Integration and Implementation

FWO action plans are developed and implemented from

- IPS reviews,
- Routine weekly Group Leader Meetings, and
- Monthly one-on-one standing meetings with the Division Director and/or Deputy Division Director.

Senior leaders formally review the plans quarterly to ensure the division is making appropriate progress and report this progress through group meetings and all-hands meetings. Quarterly Appendix F reviews document FWO Division performance, as does the final year-end assessment. FWO Division’s contribution to overall LANL Appendix F environmental goals is also reviewed and documented quarterly and in a written annual assessment.

The planning process allows managers to closely tie both strategic and tactical activities to budget submissions and to plan for most effective movement of staff to meet requirements. Annually, FWO develops a staffing plan and develops the budget from the staffing plan. Priorities established in the business plan become the drivers in resource allocation in the budget process. The quarterly reviews allow managers to track resource allocations and to make any necessary adjustments to either funding or human resource allocations.

Finally, development of clear strategic and action plans allows for full integration of performance requirements for each individual division employee. As Item 5.1 explains, objectives for each employee are designed to ensure that the organizational objectives are met and that the employee has a clear view of how his or her work requirements contribute to the success of the entire organization.

3 Customer, Supplier, and Others Involvement

3.1 Customer Involvement

Just as frequent and open communication marks FWO Division's internal management practices, so does it characterize interactions with customers and stakeholders. The division is highly conscious of the need to fully involve all affected parties in seeking to improve the efficiency of work and demonstrating a sustainability ethic in daily operations.

The performance measures found in Appendix F of UC's operating contract provide clear expectations, increase accountability, and improve customer relations by addressing performance issues that concern DOE. Therefore, Appendix F serves as a major vehicle for both determining customer requirements and performance levels for all of FWO Division's customer segments. Appendix F contains approximately one hundred specific performance measures and associated goals in ten major categories for evaluation. The Appendix F 18-month continuous cycle process is shown in Figure 3-1.

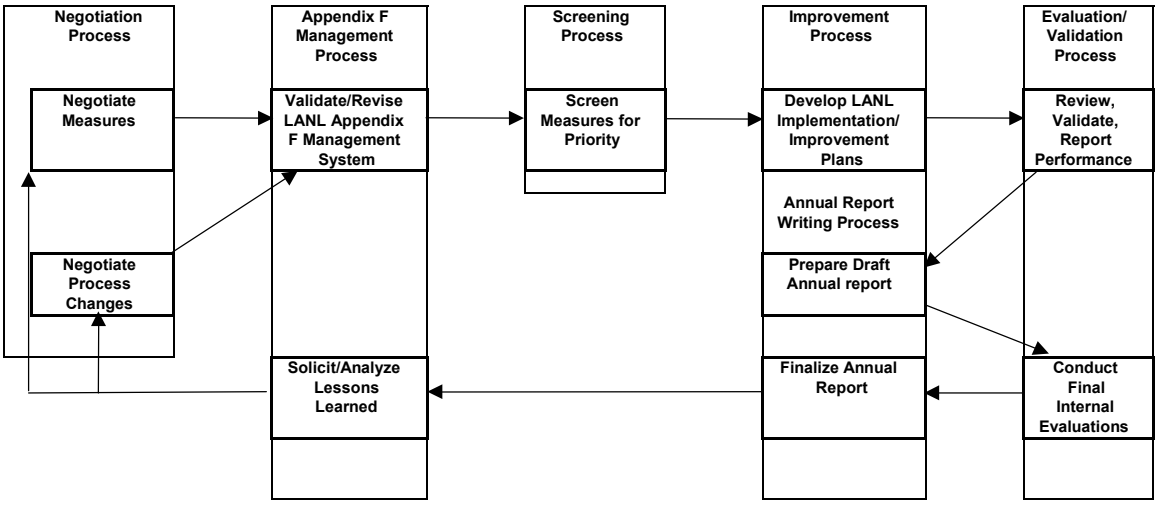


Figure 3-1. *LANL Appendix F process (18-month continuous cycle).*

FWO Division performance is also included in several of the Appendix F measures directly related to environmental excellence that fall within the functional area of ES&H. In addition to providing some specific data related to FWO Division performance, these environmental measures also show the Division's contribution to overall LANL environmental achievement.

The negotiation steps for Appendix F measures, the process to set priorities, the improvement steps, and the resulting evaluations all help focus FWO Division resources on key business processes and improve operational quality. Appendix F requires an annual self-assessment and evaluation by both UC and DOE, but FWO Division leaders also meet quarterly with UC and DOE representatives to discuss current progress against goals and to identify any issues. Senior leaders also interact more often with DOE and UC customers on an as-needed basis. The regular and frequent interaction helps prevent surprises, mitigate problems, and creates a cooperative rather than an adversarial atmosphere. Figure 3-2 shows relevant FWO environmental performance measures.

All of FWO Division's customer focus approaches are based on the model shown in Figure 3-3. Using the requirements and expectations data obtained by this model, the division can align its plan with customer priorities. The model also helps the division take action to improve customer satisfaction and close the loop with the customer.

FWO uses various tools/methods to attain customer input, priorities, and needs. VoC interviews are conducted annually by specific group function; weekly meetings are held with the facility management community; monthly waste generator meetings are held; and quarterly waste management coordinator (WMC) meetings are held.

FWO Division also uses its World Wide Web site to communicate with customers, stakeholders, and suppliers, keeping all parties well informed. The site contains extensive information, including program details while minimizing paper

consumption. The web site also allows users to send requests or comments to the immediate attention to the designated FWO customer satisfaction program manager. FWO's use of electronic communications also encourages customers to conserve resources.

To gather feedback from FWO Division employees, division management relies on two LANL programs, the annual Employee Checkpoint Survey and the Upward Appraisal Program. The Employee Checkpoint Survey monitors employee perspectives and contains standard types of questions in general categories including safety, productivity, and customer focus. The structure of the survey allows FWO senior leaders to perform comparisons with other operational divisions within LANL and also with other companies. For one year, FWO Division participated; however, due to the Cerro Grande Fire, in 2000, an Employee Checkpoint Survey was not conducted.

Functional Area	Measure	Focus
ES&H	1.2.c	Waste Minimization, Affirmative Procurement, Energy and Natural Resource Conservation
ES&H	1.2.g	Injury/Illness Prevention
Environmental Restoration & Waste Management	2.2.a	Legacy Waste Work Off
Environmental Restoration & Waste Management	2.3.b	TRU Waste Processing
Environmental Restoration & Waste Management	2.4.c	TWISP Retrieval Project
Environmental Restoration & Waste Management	3.2	Effectively Manage Newly Generated Mission Waste
Environmental Restoration & Waste Management	3.2.a	Newly Generated MLLW Treatment and Disposal
Environmental Restoration & Waste Management	3.2.c	TRU Waste Storage
Environmental Restoration & Waste Management	3.2.d	Radioactive Liquid Waste
Environmental Restoration & Waste Management	3.2.e	Low-level Waste (LLW)
Environmental Restoration & Waste Management	3.2.f	Chemical and Hazardous Waste
Facilities & Project Management	5.2	Effectively Manage Energy Use
Facilities & Project Management	5.3	Manage Energy Use Against a Management Plan

Figure 3-2. *FWO relevant Appendix F Measures.*

FWO Division has also participated in LANL's annual Upward Appraisal Program, which allows employees to provide direct feedback to managers regarding the supervisors' behavior and ability in areas such as ES&H; communication; and accountability. Due to the Cerro Grande Fire in 2000, an Upward Appraisal was not conducted

Division managers review the information from these instruments and use it to help establish goals and corrective actions. Finally, management walk-arounds provide an opportunity for managers and employees to interact informally and to jointly review safety and environmental issues in the workplace.

To monitor public perception, FWO Division relies on an annual survey of public opinion, which LANL has conducted since 1998. The resulting reports profile New Mexico community leaders' awareness of and satisfaction with LANL operations. The survey also helps to identify current and emerging issues of importance to leaders in the region. In addition to asking about general perceptions of LANL, the survey allows respondents to voice their opinion of LANL's environmental responsibility. Results from the survey are recorded, analyzed, reviewed, and used in planning activities.

As discussed in the Overview Section, FWO Division is a non-profit organization with a fixed market (LANL) and captive customers. Therefore, criteria that call for information regarding expanding markets, developing business opportunities, or potential customers are not applicable.

FWO recognizes that the customer is the only one who truly knows what s/he needs. To acquire this information, FWO developed and implemented the Customer Service Satisfaction (CSS) Program. CSS is a full-service on-line customer service and satisfaction system that provides automated tracking and documenting of phone calls, issues, findings, com-

plaints, compliments, and service requests. The system interfaces with e-mail, the electronic communications channel at the Laboratory, to automatically generating assignments, reminders, and status reports of customer issues. FWO depends on this system to respond to and follow-up on customer complaints, inquiries, suggestions, and compliments. When the system receives a deficiency or observation, the CSS manager assigns a person to address the customer's problems and sets a date for resolution. The system provides notifications to the CSS manager and the assignee and reminds them when a resolution is due (or overdue). The system is allowing FWO to gather and analyze key customer service data. Based upon results of these data, we are able to respond to problem areas and to recognize employees who deliver world-class customer service.

FWO uses the data from the system to gain knowledge of what is important to our customers, where and how we can improve our services, and how our system is working to improve our customer relationships. The system automatically calculates our timeliness (the time it takes to assign a customer issue, as well as the time from customer issue raised to resolution), a key indicator of customer satisfaction for the Division, and tracks performance in on-demand reports. FWO managers review response timeliness at QPRs and create action plans for improvement.

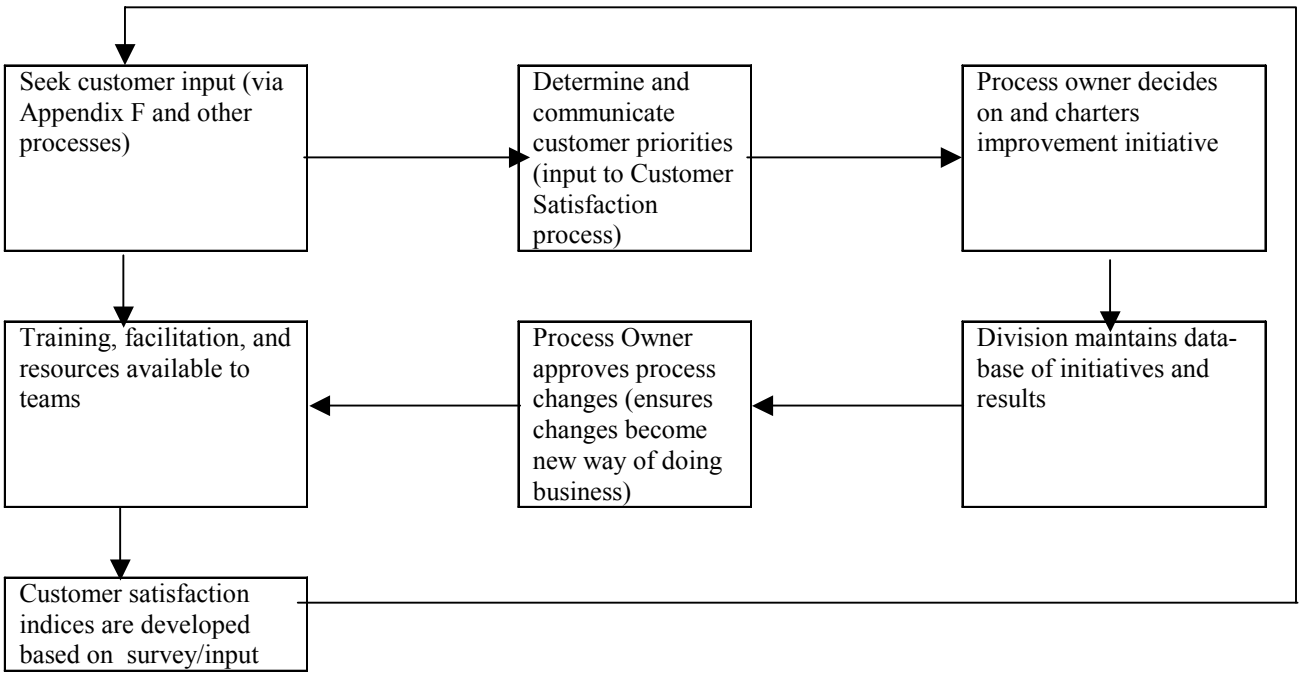


Figure 3-3. *FWO Division's customer satisfaction model.*

3.2 Supplier Involvement

Most of FWO Division's opportunities to interact with vendors on the basis of environmental concerns are limited. However, FWO has technical oversight over JCNNM who provides site-wide services. JCNNM follows safe-work practices, participates in P2 and in many instances is the founder of new processes that result in significant cost savings to the institution, including Green Zia tools called out in Appendix F. LANL financial policies require that most product/service purchases be coordinated through LANL's BUS Division. Specific supplier requirements are defined for each supplier in a customized contract, which is negotiated, implemented, managed, and evaluated by BUS procurement personnel. BUS is also responsible for evaluating the overall performance of suppliers, as specified in Appendix F. FWO Division adheres to all mandates.

Within its limited sphere of interaction with suppliers, FWO Division does, however, employ several environmental considerations. For example, FWO procures computers via the LANL Just-In-Time vendor. The division ensures that all new computers are equipped with Energy Star, an energy saver function that turns off the monitor's screen when the

computer is not in use. The division is also making a determined effort to ensure that purchased office products, including paper, contain recycled content.

To minimize the use of paper, when possible, printers and copiers are set to automatically print double-sided, and new equipment will be required to have that capability. The use of electronic messaging and a comprehensive web site also promote the minimization of paper usage. FWO encourages standardization of equipment type, toners, energy conservation, etc. for current and new purchases. Many facility buildings use auto shut-off light switches. The division also promotes saving of wastes and expense associated with travel by championing teleconferencing, distance learning, and primary attendees who share information upon return.

3.3 Others Involvement

One of FWO Division's primary methods of communicating and involving other interested parties is through participation in the New Mexico Green Zia Environmental Excellence Program. The Green Zia Program is a statewide initiative designed to encourage businesses to focus on P2/E2 as an economic business advantage. Established by the 1998 New Mexico legislature, the Green Zia Program is administered by the New Mexico Environmental Alliance, a partnership of state, local, and federal agencies; academia; business and industry; and environmental advocacy groups. The basic premise of the program is that waste is the result of inefficiency, and by reducing waste a company can increase its profits. The environmental benefit is clear: waste that is never created does not pollute. Participation in the program gives FWO Division an annual third party, independent evaluation of successes and opportunities for improvement in environmental performance. Previous Green Zia Environmental Excellence Program feedback reports for the TWISP and the DF Group have significantly enhanced FWO in current and future P2/E2 conservation efforts.

FWO Division accounts to governmental agencies and the public for reportable environmental occurrences in a timely and thoroughgoing fashion by means of the DOE Occurrence Reporting and Processing System. Final occurrence reports are available at http://drambuie.lanl.gov/~esh7/Finals/ and in public reading rooms.

As FWO is two years young, FWO is in the process of identifying and engaging an external advisory committee to help the division assure that it is aligned with customer and stakeholder expectations and with best financial and business practices.

An FWO group that has taken the lead in this connection is DF, discussed in Item 1.1. The DF Quality Team conducts annual landlord-tenant agreement consultations with all tenants of facilities for which DF serves as physical plant manager.

4 Information and Analysis

4.1 Information Collection Management

The Appendix F Process (see Item 3.1) is a key performance indicator of FWO Division's contractual requirements and also a measure of customer satisfaction. Appendix F data also allows the division to compare its performance with other similar government-owned, contractor-operated institutions. Managers monitor progress related to performance goals and use that information to develop and/or modify operational plans and to identify areas for improvement. Results presented in Category 7 show that overall scores in most of the Appendix F functional areas have improved over the past years or remain at a sustained high level, indicating DOE approval of performance in this area.

Many of the Appendix F measures evaluate total LANL performance in environmental arenas. Because the measures include all aspects of LANL operations, FWO Division's performance contributes to the ultimate evaluation score. FWO Division has identified the following LANL-wide environmental performance measures as being directly applicable to the division and closely monitors performance levels:

- management walk-arounds;
- environment assessment program;
- injury/illness prevention (see Figures 7-7 through 7-10);
- E2 and utilities conservation (see Figures 7-1 and 7-2); and
- source reduction and P2 (see Figures 7-3 through 7-6).

LANL senior leaders also monitor progress toward full implementation of ISM (see Item 1.1). ISM contains two improvements for 2001:

- using ISO 14001
- ISM self-assessment

Using ISO 14001 as a guide to establish requirements for a robust environmental management system, ISM is being improved to include an even stronger focus on environmental performance.

This year each LANL division, including FWO Division, is preparing a self-assessment against ISM requirements, including requirements for environmental protection. This assessment will help shape institutional priorities and will also help FWO Division identify and begin to improve its most significant environmental weaknesses. This self-assessment will be an annual process.

Another aspect of ISM is the institutional Safety Concern Program (SCP), a no-fault partnership between workers and managers to identify and resolve safety concerns. The program is designed so that managers receive electronic notification of the safety concern, and the submitter receives periodic updates as the concern is tracked to resolution and closure. FWO Division managers track the issues raised by division employees to assure that issues are addressed and to identify the types of employee concerns.

In addition to monitoring its relative contribution to overall LANL institutional performance as measured by Appendix F, FWO Division also tracks information gathered through participation in LANL institutional programs. For example, senior leaders review results from LANL's public opinion survey and also analyze division-specific information from the annual Employee Checkpoint Survey and Upward Appraisal. Internal data such as that from operational performance and improvements also plays a role in management's review of FWO Division.

FWO Division leaders also gather data on other aspects of the division's environmental performance:

- In addition to its contribution to overall LANL performance in injury/illness prevention, FWO Division specifically measures and tracks its own performance in this area (see Figures 7-7 through 7-10).
- Division management recognizes that employee injuries and illnesses have a direct impact on productivity. Monitoring the effectiveness of management walk-arounds also helps assure that managers are aware of and can correct potentially dangerous or unhealthy situations.
- This year for the first time, FWO Division (in its entirety) will receive impartial evaluation and feedback on its environmental performance through participation in the New Mexico Green Zia Environmental Excellence Program.

Division managers will begin tracking this measure and will use identified opportunities for improvement as initiation points for remedial actions.

- Process changes save not only physical resources but also result in time and cost savings. FWO Division monitors process performance and tracks these savings.
- To ensure environmental compliance and enhancements to existing programs, FWO also monitors violations, exceedances, releases, fines, etc.

4.2 Analysis and Decision-making

FWO Division managers systematically analyze data to develop the information necessary for wise decision-making. The planning process described in Item 2.1 forms the basis for the annual roll-up of a comprehensive set of goals and objectives. Annually we review our group goals as captured in our forward-looking appraisals, document how we did, and develop certain future goals. Quarterly, DOE provides feedback on overall LANL performance, and the division formally evaluates progress toward Appendix F goals. On a more informal basis, operational data is presented and analyzed at management meetings that include all leaders within the division. FWO Division managers review all the data identified in Item 4.1 on at least an annual basis, with the majority of information being evaluated much more frequently. Semi-annually, FWO conducts a JCNNM performance evaluation on their accomplishments for the period, P2/E2 conservation, i.e., power plant efficiency, energy metering, waste minimization, recycling, affirmative procurement, etc. FWO and JCNNM develop objective performance measures for each evaluation cycle (semi-annual and/or annual measures) that has dollar amounts attached to each performance measure. Results dictate dollar award.

5 Employee Involvement

5.1 Employee Education and Skill Development

LANL's Performance Management System (see Figure 5-1) requires all groups in FWO Division to establish objectives, which support the organizational goals. Objectives for each employee in the group are then designed to ensure that the organizational objectives are met and that the employee has a clear view of how his or her work requirements contribute to the success of the entire organization. The system ensures that employees know what job results are expected, how they are expected to perform work, how their performance will be reviewed, the impact their contributions have on achieving the organization's objectives, and how this is tied to rewards or consequences. The Performance Management System ensures clear two-way communication during the goal-setting phase of the process and provides a focus for ongoing discussion about work objectives and processes. Specific aspects include

- aligning group and individual expected results with institutional goals;
- identifying and assessing individual performance results/accomplishments;
- evaluating performance of institutionally defined behaviors;
- describing how individuals helped to meet organizational objectives;
- linking performance to rewards or consequences;
- designing development plans to support improving performance in current jobs and/or increasing impact on the organization;
- enhancing employee/manager ownership of individual and organizational performance; and
- improving two-way communication between supervisors and employees.

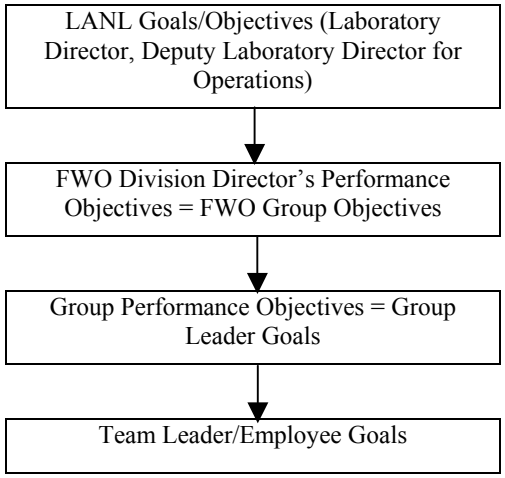


Figure 5-1. *LANL's Performance Management System.*

As part of performance management, FWO managers work with each employee to prepare individual development programs, both short- and long-term on an annual basis. As employees and their managers' work together to identify how they will contribute to group and division goals, they identify the need for new skills and competencies and jointly develop a growth plan. It is then up to managers, if feasible, to supply the resources (time, money, and support) to enable and encourage the employee to accomplish his or her development plan. Throughout the year the manager and employee evaluate the development and learning objectives to address changing employee and company needs.

Once developmental goals have been established, employees may participate in appropriate training offered by LANL or other organizations. LANL's ESH Division offers over 40 courses related to environmental issues, from general safety

training and first aid to courses on such specific topics as packaging and transporting hazardous materials. Training may be used to improve skills needed for current/planned job performance or to develop new capabilities.

Communication, cooperation, knowledge, and skill sharing among individuals and teams are accomplished through regular meetings and participation on teams. To ensure customers' needs are met and services are always available, cross training is encouraged, developed, and implemented.

FWO Division employees may also participate in LANL's institutional career development program, which helps identify skill gaps and excesses. Using available information and training, employees can choose to enhance their existing skills or to further develop other skills that LANL needs now or for future programs.

Training programs are a key component to assuring actions by workers that reflect integrated plans. Training generalists from LANL's Human Resources (HR) Division work with FWO Division managers and employees to identify specific training requirements for work being performed, establish appropriate programs, enhance quality, and assure continuity between all aspects of training. Training on standardized practices such as emergency operations is conducted on a LANL-wide basis. Site- and task-specific training is also provided for FWO Division projects and facilities.

FWO-SWO is responsible for the institution's WMC program. This program provides site-specific training to the coordinators.

5.2 Employee Involvement

A major emphasis in FWO Division is that every employee understands his or her role in achieving organizational and institutional goals, including those related to environmental performance and P2/E2. For example, the ISM implementation strategy developed for the division emphasizes employee understanding and involvement. Division managers offer employees a wide variety of ways to have an influence on how the division conducts business.

FWO managers encourage employees to openly discuss problems, issues or concerns; to propose solutions or resolutions; and to exchange ideas between themselves or their peers through management's open-door policy, during meetings, email, etc. All input is listened to, and further investigation occurs, when appropriate.

The annual Employee Checkpoint Survey and the Upward Appraisal Program provide ways for employees to give anonymous input. Employees can also address environmental issues and questions to FWO through the customer satisfaction web site, safety concern program, email, hand-written note, phone call, etc.

LANL's Environmental Stewardship Office (ESO) has also established an electronic mechanism for soliciting employee input on P2/E2 in product, service, and process design. FWO Division employees, as well as any LANL employee, can send comments, observations, or questions to wastenot@lanl.gov. FWO has received at least three P2 awards during the past two years at LANL's Earth Day ceremonies; each award is an FWO employee teaming effort.

Some FWO Division employees also belong to various Laboratory-wide committees such as Grassroots Safety Volunteers, Lab-wide All Days Are Safety Days, Institutional Ergonomics, and the Laboratory Standards Working Group. These committees serve as a method for sharing ideas and initiatives related to ISM implementation across the institution.

Division employees also take advantage of institutional mechanisms to minimize waste. For example, when employees have supplies, equipment, and materials that are no longer needed, the property administrators assigned to FWO Division can ensure that it is re-used. Employees can also advertise unused equipment on the LANL electronic Swap Shop, where excess property is made available to the rest of LANL. To ensure that LANL has an institutional waste management program that consistently addresses critical issues, such as waste minimization, several FWO Division employees participate on LANL's Waste Management Policy and Procedure Council (WMPPC). The WMPPC is a Laboratory-wide, interdivisional organization that provides technical oversight of institutional waste management requirements and technical expertise on waste management issues.

FWO Division's efforts to impact the environmental and safety culture of the surrounding communities begins with the Laboratory Director's "six zeros" (see Item 1.1). One of the goals is to have zero injuries or accidents off the job. Thus, employees are expected to translate the LANL safety culture to their own homes and families.

FWO is responsible for managing and maintaining the institution's High Occupancy Vehicle (HOV) Program. This program promotes carpooling as it minimizes the environmental impact on the local community and assists in fuel conservation. In high-traffic areas of the Laboratory, FWO established reserved parking for HOVs. The parking areas are

assessed and refinements made to the program, if required. The LANL daily *Newsbulletin* maintains an electronic "Commuter's Corner" where prospective car-poolers can advertise or look for ride-sharing opportunities.

Supplementary fuel conservation activities employed by FWO involve operating six electric vehicles and numerous compressed natural gas vehicles. FWO employees actively participate in recycling aluminum cans, toner cartridges, paper, newspapers, cardboard, telephone books, and magazines.

One key process by which division employees actively address community environmental issues is through coordinated volunteer efforts. The LANL Community Involvement and Outreach Office is the focal point for such activities. Maintaining a list of over 400 potential LANL volunteers (including FWO Division employees), it matches volunteer interests with community activities. Although volunteer opportunities include a wide range of activities, from tutoring to foster care, many are focused on environmental issues. For example:

- In 2000, they coordinated employee involvement in a community clean-up day in three surrounding cities: Los Alamos, Espanola, and Santa Fe.
- Following the Cerro Grande Fire in May 2000, between 200 and 300 LANL volunteers (including many from FWO Division) donated weekends to help with recovery efforts.
- LANL volunteers donated time to help the U.S. Forest Service plant 12,000 seedlings as part of ongoing efforts to recover from the Cerro Grande Fire.

5.3 Employee Satisfaction, Value, and Well-being

FWO Division supports a safe work environment for employees and ensures that FWO employees perform work safely and in an environmentally friendly manner by building on LANL safety programs such as ISM.

FWO Division's major formal method for determining employee attitudes and the climate in the workplace is the annual LANL Employee Checkpoint Survey. While the survey has been used for the past six years throughout LANL, FWO has only been involved in 1999, as it was not conducted in 2000 due to the Cerro Grande Fire.

The ISM database tracks deficiencies identified during walk-arounds until the deficiencies are resolved and compiles the deficiencies to identify and improve safety performance.

Furthermore, managers meet with employees to discuss individual safety commitments and hazards identified with each job. FWO Division employees may also enter and track their own safety issues through LANL's web-based Safety Concerns Program (see Item 4.1).

There are also institutional incentives to encourage staff to work smarter and utilize innovative approaches to accomplish their work. The Pollution Prevention Awards Program, sponsored by LANL's ESO, is open to all LANL employees and subcontractors. It is designed to encourage individuals and teams to develop plans, programs, or ideas for minimizing waste; conserving water, electricity, or natural gas; reducing air or water pollution; or procuring products with recycled content. Recipients of the awards receive recognition and a cash grant from specially allocated congressional funds.

The Los Alamos Awards Program, administered by LANL institutionally but tailored for application at the division or program level, provides a link between the organization's mission and those employees or teams that achieve significant accomplishments toward that mission. FWO Division managers use the program to recognize exceptional contributions and noteworthy achievements by awarding their employees, either individually or as teams.

As part of the larger LANL community, FWO Division relies primarily on institutional programs to enhance support for employees. LANL offers a comprehensive set of support initiatives along with feedback systems. Division employees are encouraged to use all LANL services that are appropriate and relevant to their individual needs.

To provide emotional support, LANL provides an Employee Assistance Program whose main goal is to assist employees with personal problems that are affecting their job performance. For employees' physical well being, LANL maintains a Wellness Center. The center offers equipment and specific areas for weight training and aerobic exercise in individual and group formats, and a wide variety of exercise and health programs including stress management, healthy eating, yoga, and cardiovascular fitness.

Division employees may choose between two basic work schedules, a traditional 5-day/40-hour week or a new 9-day/80-hour schedule, which allows employees every other Friday off. In addition, FWO Division allows employees, with prior agreement of their managers, to use some flexibility in their regular work schedules to meet personal needs.

LANL provides employees and managers formal guidance on administrative reviews and grievances; the institution provides responses to informal queries as well as guidance to employees or management on relations in the workplace; and support is available on such subjects as counseling, sexual harassment, violence in the workplace, and interpersonal skills.

An Ombuds Office is available to any individual in the workforce and provides services including addressing work-related issues, assisting employees in obtaining services or expediting actions, and providing mediation services.

6 Process Management

6.1 Process Characterization and Control

Each group identifies product and service attributes that lead to the development of specific performance measures. Major products and process redesign work follows the Plan-Do-Check-Act (PDCA) cycle (see Figure 6-1). FWO has proactively created and/or enhanced processes that encompass P2/E2 conservation. Customers and stakeholders reap the benefits of these programs.

The IPS system generically embodies the closed-loop PDCA quality process. We use IPS to outline the overall project and responsible parties, to ensure that we establish a goal, schedule, and resources and to set a plan in place. FWO managers act as executive owners of FWO Division's key processes (see Figure 0-2). We capture all division work in the IPS, and it serves several purposes within the division:

- clearly defining the expectations and plan that is commonly understood across the organization;
- communicating expectations, so that we document and respect obligations and commitments; and
- imposing a disciplined approach to change control, so everyone knows what is changing, when, and what the impact is.

The system facilitates assignment of responsibilities, establishment of appropriate levels of effort, and reporting of progress throughout the division. Perhaps most importantly, IPS reinforces the need for us to plan our work in a consistent way, to consider the value of resources, and to use a disciplined project management approach for existing and new efforts.

Generic planning elements of the IPS system (the Plan) include clarifying the objective of the new process; identifying key customers and stakeholders; assembling a team of personnel (including stakeholders and customers) with the necessary technical capabilities and resources; breaking the objective into identifiable, discreet tasks with milestones and schedules; and modifying the plan as necessary to embrace changing conditions and requirements. Plan execution constitutes performance of the work (the Do) followed by piloting or testing the project (the Check) and then acting on this knowledge to refine and improve the process or product (the Act).

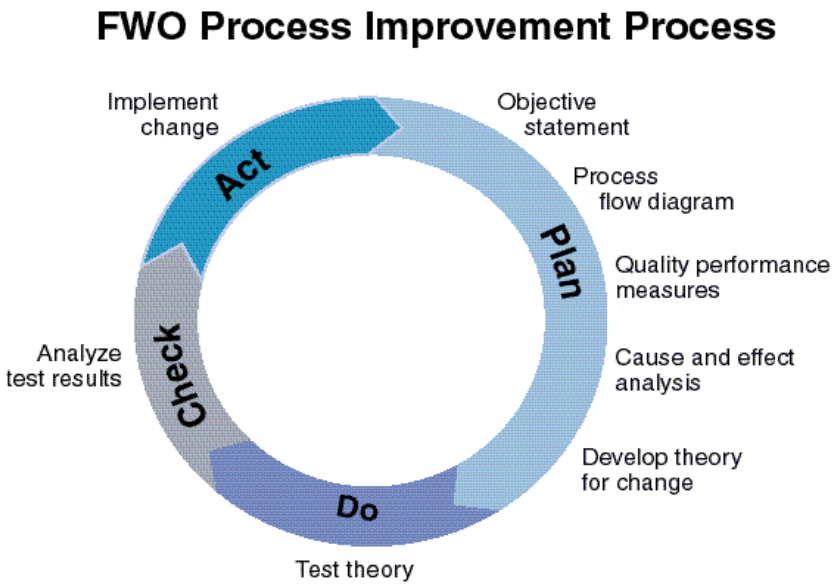


Figure 6-1. *FWO manages processes using the Plan-Do-Check-Act cycle.*

Formal operational assessments occur during quarterly, semi-annual, or annual reviews (see Item 4.2), but leaders may also consider operation performance at any management meeting. FWO management uses the wide variety of data described in Item 4.1, including data from customers, employees, and operational reviews, to assess the performance of

key processes. Customers, including both LANL employees and LANL managers, are intimately involved in process evaluations. Employees provide operational evaluations through their input to management. Both DOE and UC stakeholders are active participants in establishing performance expectations and in evaluating operational achievement through the Appendix F process (see Item 3.1).

6.2 Process Improvement

As Item 6.1 explains, FWO Division has a contractual mandate to continuously monitor and analyze processes for potential improvements. Use of Appendix F as a framework for process analysis and comparative evaluations is a mature, seven-year-old system that has yielded significant improvement in most areas reviewed.

In addition to the analysis and improvement carried out for Appendix F, FWO uses the LANL framework of annual ISM self-assessments to identify significant environmental performance issues. This framework requires each division, including FWO Division, to assess its ES&H performance. The LANL Feedback & Improvement Board (F&IB), which sets improvement priorities and goals institutionally, reviews findings. The F&IB then provides institutional guidance for improvement efforts to all LANL organizations. At the division level, management becomes responsible for providing necessary resources to achieve improvement targets and for monitoring progress toward goals. Figure 6-2 summarizes this process.

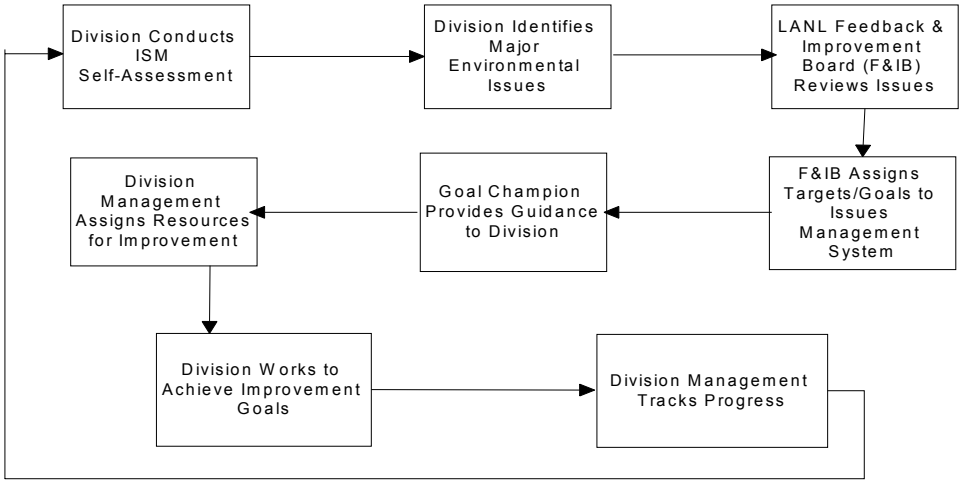


Figure 6-2. *FWO Division's improvement process based on the LANL ISM annual self-assessments.*

We continually evaluate our products and services based upon performance measures and customer input. Using established techniques such as facilitated as-is, should-be scenarios; needs assessment techniques; and customer surveys/interviews, the division rigorously deploys customer tools to assess gaps between the existing and desired state.

FWO management reviews process performance results at least quarterly at the QPR. They may recommend a further review of the metrics by customers for adequacy and appropriateness. In addition, each group leader routinely reports monthly at IPS reviews on the status of his or her effort, including key process performance and customer satisfaction.

Some of our process owners conduct surveys assessing the level of customer satisfaction with service delivery or request that a VoC be conducted. This works well in established delivery areas that have been in use for some time. Other process owners act more proactively by approaching customers and asking questions to determine their specific requirements, which is more useful when working with a new or unique product.

Results from improvement efforts are communicated to senior leaders at management sessions and as part of the Appendix F quarterly assessments. Employees learn about process improvements through personal participation, at the all-hands meetings, and through information published electronically or as memos.

DOE learns of results through formal institutional lines of communication, and other stakeholders (vendors, the community) are informed through BUS contacts or by means of public affairs initiatives. Annual publications also provide stakeholders with yearly updates on environmental performance. *For the Seventh Generation: Environment, Safety, and Health at Los Alamos National Laboratory* is an annual report prepared specifically for residents of communities surrounding LANL. The *Site-Wide Environmental Impact Statement Yearbook* is another publication that evaluates LANL environmental performance and tracks progress toward established goals.

Continuously monitoring and analyzing processes for potential improvements, FWO has enhanced and/or developed pro??cesses to improve P2/E2 and waste minimization. FWO-SWO is responsible for the institution's WMC program. This responsibility requires development of training for all of the WMCs, providing updates on all new/revised regulatory requirements, operating procedures for the various treatment storage and disposal facilities (TSDF), and opportunity for information exchange amongst the WMCs through quarterly meetings. SWO obtains feedback from the quarterly meetings to improve the waste management system or respond to information requests from DOE Headquarters. Via meetings and electronic communications, the WMCs share lessons learned through the non-compliance reporting (NCR) system. SWO manages and maintains the NCR System.

Upon completion of training and/or development of requested new/required training, FWO obtains feedback from the WMCs (via VoC interviews, evaluation forms, electronic communications), evaluates the input, and uses it for continuous improvement of training as well as ESH Division and HR Division doing the same.

Additional examples are

<u>*Green is Clean*</u> - FWO has implemented a program called Green is Clean to release certain wastes that, although generated in Radiological Controlled Areas (RCAs), are known to be free of regulated contaminants including radioactivity. Green is Clean is a P2/waste minimization program; if Green is Clean materials are recycled, waste has been prevented; if waste is diverted from the LANL LLW disposal facility, LLW waste has been minimized. Green is Clean materials/waste are known by the generator to be uncontaminated, low-density materials (e.g., paper, thin plastic, cardboard, etc.). In such low-density materials, it is possible to measure radioactivity at very low levels, even non-penetrating alpha particles; these document the knowledge of the waste-generating and segregation process, and the ability to detect minute quantities of potential contamination provide defense-in-depth for the Green is Clean Program. (See Figures 7-3 and 7-4.)

Radiation detection instruments used to verify Green is Clean waste are capable of detecting radioactivity at levels that will ensure protection of human health and the environment now and in the future. The following radiation detection equipment meets the radiation detection criteria:

- *WAND* - which uses six phoswich detectors to scan shredded low-density waste moving past the detectors on a conveyor belt.
- *HERCULES* - is a similar one for bagged or boxed low-density waste with three phoswich detectors, that are designed to scan the waste for evidence of TRU and other common DOE radionuclides (like uranium or activation products).
- *LRAD* - sweeps ions created in air by alpha contamination through ionization detectors looking for evidence of TRU or uranium contamination.

To determine detection limits that provide this assurance, a dose assessment was performed. The dose assessment was used to calculate concentrations of radioactivity that could, should the segregation step fail, inadvertently be present and not detected in Green is Clean waste without any risk to human health or the environment.

Under the Green is Clean Program, FWO will release waste for disposal at the Los Alamos County landfill that is known to be non-radioactive material. To verify that the waste is safe for solid refuse disposal to the Los Alamos County landfill, FWO has implemented a rigorous measurement program to ensure that no waste found to contain detectable levels of residual radioactive material will be released.

<u>*MRF*</u> – This is a Laboratory-wide program. The MRF is designed to manage solid waste refuse collected throughout the Laboratory by sorting and segregating the waste as solid waste, recyclable waste, and NMED-prohibited waste (which will be shipped off-site). After waste inspection is complete, the waste is fed to the conveyor/baler for compaction, placed on a flatbed trailer, and shipped for disposal to an approved waste landfill or recycler. Typical solid wastes accepted into the facility follow:

- Dumpster Waste - Solid waste consisting of research facility and office refuse and recyclable materials that are removed, some paper and cardboard, plastic, and other waste generated from office activities;
- Recyclable Material – Other paper/cardboard, wood, and other appropriate recyclable materials; and
- Other solid wastes as appropriate.

The waste compaction reduces the overall final volume of LANL waste sent to the Los Alamos County landfill by five volumes. Roll-off waste, weed-control debris, yard clean-up debris, light construction wastes, broken pallets, etc., do not meet MRF waste acceptance criteria and are segregated and managed appropriately.

TRU TWISP - TWISP recognizes that the work activities performed have unique potential for risk to worker health and safety as well as potential hazard exposure to the environment and community. The potential hazard risks are identified and managed by a project Safety Analysis Report, a health and safety plan, a quality assurance project plan, work control procedures, and various administrative control documents. The TWISP Leadership System ensures that LANL zero-goals are entrenched into daily operations, that worker health and safety incorporates zero injury and illness and zero waste generation, and that work is accomplished without environmental incidents.

Project personnel involvement is the single greatest success factor for the excellence achieved by TWISP. Most of the improvement ideas have come from TWISP employees, such as:

- reviewing MSDS before procuring a non-hazardous liquid cleaner, to eliminate disposal of MLLW or hazardous waste;
- removing packing materials to eliminate radioactive waste;
- segregating and controlling materials permitted into the RCAs to reduce radioactive waste and recycle these materials;
- using launderable personal protective equipment (PPE) and reusing unusable PPE as cleaning rags;
- improving the drum retrieval operation with an adjustable forklift-grasping hook, which is now used for all drum-handling operations at LANL's main waste management site, TA-54; and
- drum washers have replaced manual worker drum cleaning for worker safety and potential as low as reasonably achievable considerations.

Similarly, the goals focusing on safety and corporate citizenship broadly include concern and respect for the environment. To actively demonstrate managerial commitment to these goals, FWO continues to be an advocate and promoter of P2/E2 through awareness and sharing accomplishments, observations, and concerns throughout the DOE complex, such as:

Empty Drum Reconditioning – This is a Laboratory-wide program. The project involves collecting empty five- to 110-gallon steel and plastic (poly) drums that would have been treated as hazardous waste, not having been triple rinsed, and instead sending the drums to the Western Container Company in Denver, Colorado to be cleaned, reconditioned, and resold. Since empty drums almost always contain a residual film from the previous contents, they were handled as hazardous waste in the past. Otherwise, the steel drums were recycled and sent to a facility with a metal furnace that could melt down the drums and use the steel to make new drums or other products. Although the steel in the drums is technically recycled, the new process of sending usable empty drums to be reconditioned is cheaper, less energy-intensive, and a more direct recycling route. An avoided-hazardous-database has been developed and implemented for this project. Avoided-hazardous-waste costs of (31,765.2 kg * $12.75/kg) is a savings of $405,006.30 to date.

MLLW Programs – FWO consistently and diligently searches for ways to combat waste pollution. FWO actively seeks process improvements through analysis and partnering with others throughout the DOE complex, and three distinct MLLW Programs have been instituted. These are

1. TA-53 Avoided MLLW Metals Processed as Recycled Metals – FWO supported the Los Alamos Neutron Science Center (LANSCE) to avoid MLLW metals and reprocess them as recycled metals for reuse. Various LANSCE Area A-Beam components and metals were drained of petroleum products, had RCRA-metal-containing switches removed, were segregated into eight B-25 boxes and a fume hood, and were sent with the shipment to GTS Duratek Metal Melt for segregation and metal recycle. The overall project involved many LANSCE facility man-hours to allow for segregation and removal of items that needed to be properly configured and disposed of. The 865 cubic feet of avoided MLLW had waste disposal savings of $265,000; the metal was processed as recycled metal. This

process was reviewed by the LANL Audits and Assessments Division and was identified as a "Best of Class" material processing and teaming effort.

2. Avoided MLLW through Segregation and Reclassification – FWO-SWO avoided MLLW through material segregation and reclassification of four B-25 boxes (384 cubic feet) and 18 various sized containers (80 cubic feet) of MLLW (464 cubic feet total) from different LANL waste generators. The boxes were opened, and the materials were verified, segregated, and consolidated as MLLW and two B-25 boxes of compactible LLW. The project was left with four B-12 boxes of MLLW (192 cubic feet) for treatment at a vendor facility that charges by the volume and by the individual containers.
3. Avoided Mixed Waste through Segregating Circuit Boards as Scrap Metal for Recycle – This is a Laboratory-wide program. FWO and ESH-4 developed a program that recycles used circuit boards removed from old radiation instrumentation which were used in RCAs as "Scrap Metal for Recycle." This program is responsible for avoiding approximately 140 cubic feet of MLLW since its inception in 1999. While old circuit boards do not contain nickel cadmium batteries and mercury switches, such equipment was often treated as mixed low level radioactive contaminated waste. However, such circuit boards are rarely ever exposed to external radiation due to the fact that they are typically encased within equipment. This scenario makes them ideal for recycling. Circuit boards with classified, sensitive, proprietary data or licensed software must be sent to Computing, Information, and Communications for degaussing. The clean circuit boards are then sent to a metal recycling facility for reclamation of precious metals.

The FWO TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) receives radioactive liquid wastes from approximately 1,800 generating points at LANL and treats these waters to remove radioactive and chemical impurities. The EPA, the State of New Mexico, and the DOE regulate treated waters, discharged into Mortandad Canyon. During 2000, the RLWTF made major improvements in the quality of waters discharged to the environment and in waste minimization, such as:

- *Effluent Quality* - During 2000, there were zero violations of New Mexico water quality standards, zero violations of NPDES permit limits imposed by the EPA, and zero exceedances of DOE derived concentration guidelines for radioactive liquid discharges. In order to achieve this triple crown, concentrations of two contaminants had to be reduced by more than an order of magnitude. Nitrate discharges were reduced from 60-80 mg/L to 3 mg/L in 2000. Radioactivity was reduced by more than a factor of 20 from discharges in recent years and averaged just 13 picocuries per liter in 2000. Figures 7-5 and 7-6 illustrate these improvements.

The following demonstrates FWO's waste minimization efforts at the RLWTF:

The RLWTF treatment process was changed in 1999 to address new and more stringent discharge requirements. While the new treatment processes successfully improved the quality of treated waters, they also generated more than 20 secondary and tertiary waste streams that added more than 50% (i.e., 10,000 gallons per day) to the volume of waters to be treated, resulting in severe process inefficiencies and increased treatment costs. These problems were tackled through a five-month secondary stream study.

The study started with a full-scale plant test. A 50,000-gallon batch of feed was prepared, then fed through the plant over a two-day period at normal throughput rates. The first day was used to flush process equipment, while the second was used to sample process streams at nine different locations over an eight-hour period. Nearly 400 samples were submitted to four different laboratories, each analyzed for as many as two dozen water quality parameters. The study led to a clearer understanding of the treatment process; to the construction of flow and material balances for many contaminants; and to recommendations for waste minimization. Three of the recommendations were implemented during 2000; these are

- Elimination of Clarifier Chemicals as a Secondary Stream - Tap water had been used for the dissolution of chemicals (ferric sulfate and lime) used in the treatment of waters. The plant test showed that this flow amounted to six gallons per minute, or approximately 2,500 gallons per day. These six gallons per minute then had to be processed through all treatment steps as though it were radioactive liquid waste and, in turn, contributed to the generation of other secondary waste streams. Equipment modifications were made and, beginning in mid-January 2001, partially treated process water (sand filter effluent) began to be used instead of tap water for dissolution of clarifier chemicals. This change has eliminated 2,500 gallons per day of secondary wastes.
- Reverse Osmosis Reject Stream - The plant test showed that permeate from the ultra-filter sometimes meets discharge limits and can, therefore, be discharged without further treatment in the reverse osmosis unit. When this occurs, the reverse osmosis reject stream is entirely eliminated. The study team recommended that plant operation

be modified to include the routine collection and sampling of ultra-filter permeate to assess if further treatment is required. This required the purchase of two 25,000-gallon tanks, changes to operating procedures, and additional water analyses. Now however, when analyses indicate that the permeate meets water quality standards, waters are discharged to Mortandad Canyon instead of being sent to reverse osmosis for additional (and unnecessary) treatment. This strategy has proven successful about half the time, and has thus eliminated the reverse osmosis reject stream about half the time.

- Reverse Osmosis Operation - The final treatment step in the RLWTF process, reverse osmosis, formerly rejected 20% of the waters fed to it, thus generating a secondary waste stream of 6,000 gallons per day. One study team recommendation was to change operations so that the unit ran at a 90% recovery rate. Implementation proceeded carefully in steps. Plant conditions were closely monitored, and process waters were sampled for several weeks as recovery rates were slowly increased. Tests proved successful. Today, the reverse osmosis unit is operated at 88-90% recovery, and the volume of the reverse osmosis reject stream has thus been halved whenever this unit is in operation.

In summary, studies of our secondary waste stream that were implemented in 2000 have been successful in reducing the generation of secondary wastes by about 7,000 gallons per day. Pilot tests for additional process changes are underway, and other recommendations made by the study should be implemented in 2001 and 2002.

7 Results

As has been previously stated, FWO Division is two years young. While processes have been improved or newly created, result information is minimal. Various processes have shown financial savings, but they are not presented as results other than mentioned within the text of the application.

7.1 Environmental Results

FWO consistently tracks their Appendix F data. The data is analyzed, tracked, and trended. Two years of data is being depicted.

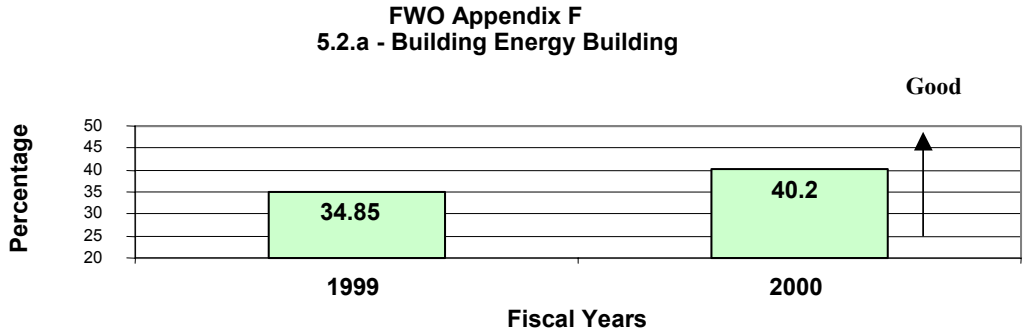


Figure 7-1. *FWO Building Energy Reduction. This Performance Measure focuses on reducing LANL energy usage since Fiscal Year 1985 BTUs per gross square feet. The increase in Fiscal Year 2000 is an accomplishment, as it demonstrates further reductions.*

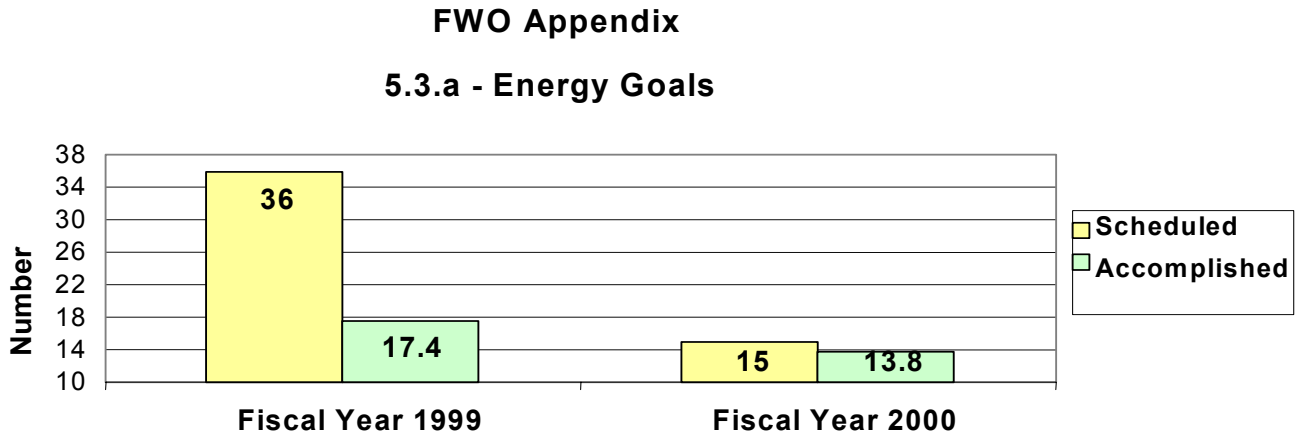


Figure 7-2. *FWO Energy Goals. This Performance Measure manages consistent energy initiatives with a comprehensive energy management plan.*

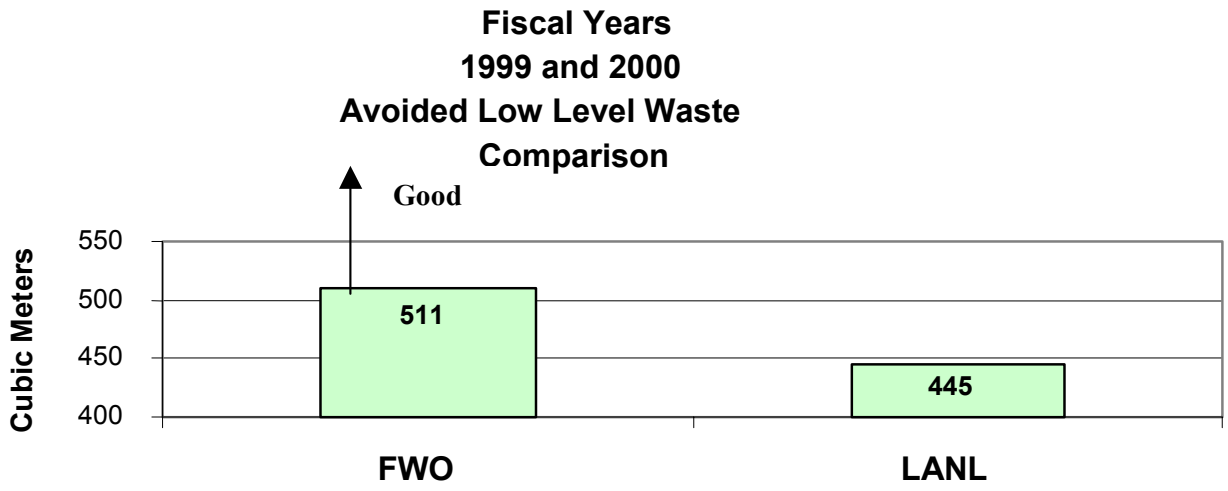


Figure 7-3. *FWO Green Is Clean Program. Green is Clean is avoided low-level radioactive waste (waste from an RCA that was verified non-radioactive and either disposed of as landfill waste or recyclable material). The graph demonstrates the success of the program, as FWO is one division compared to all other LANL divisions (excluding FWO).*

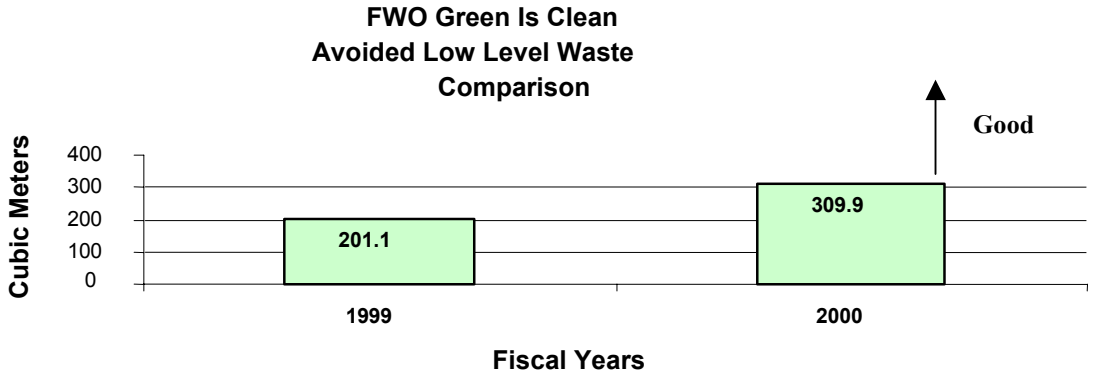


Figure 7-4. *FWO Green Is Clean Program depicts cubic meter avoided low-level radioactive waste increasing – this reduces LLW volume.*

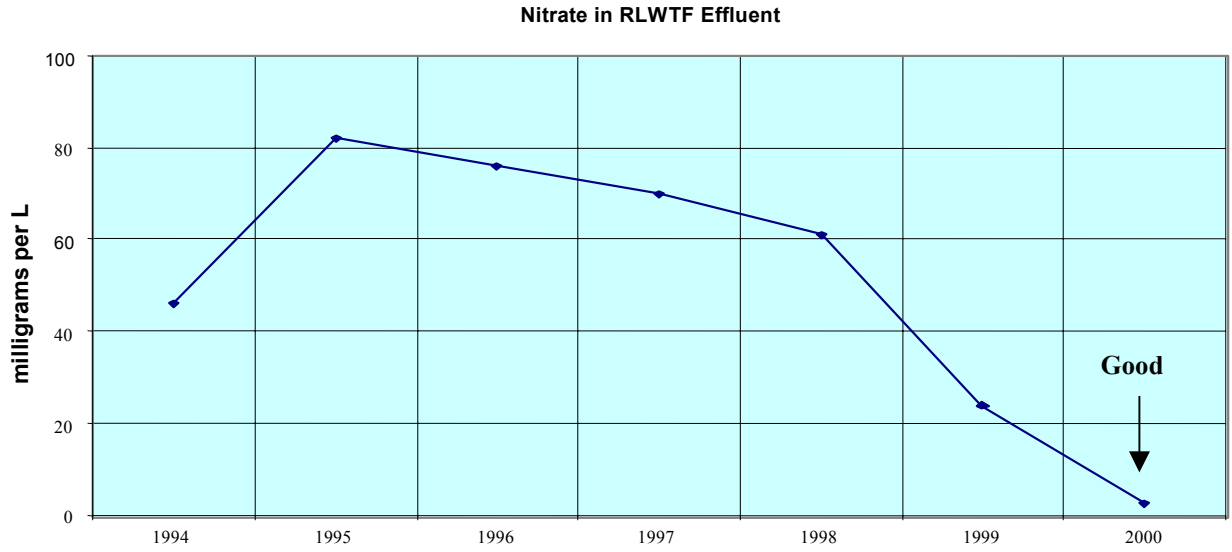


Figure 7-5. *Nitrate discharges were reduced from a high of 80 mg/L to only 3 mg/L in 2000. This is an excellent reduction of 96%.*

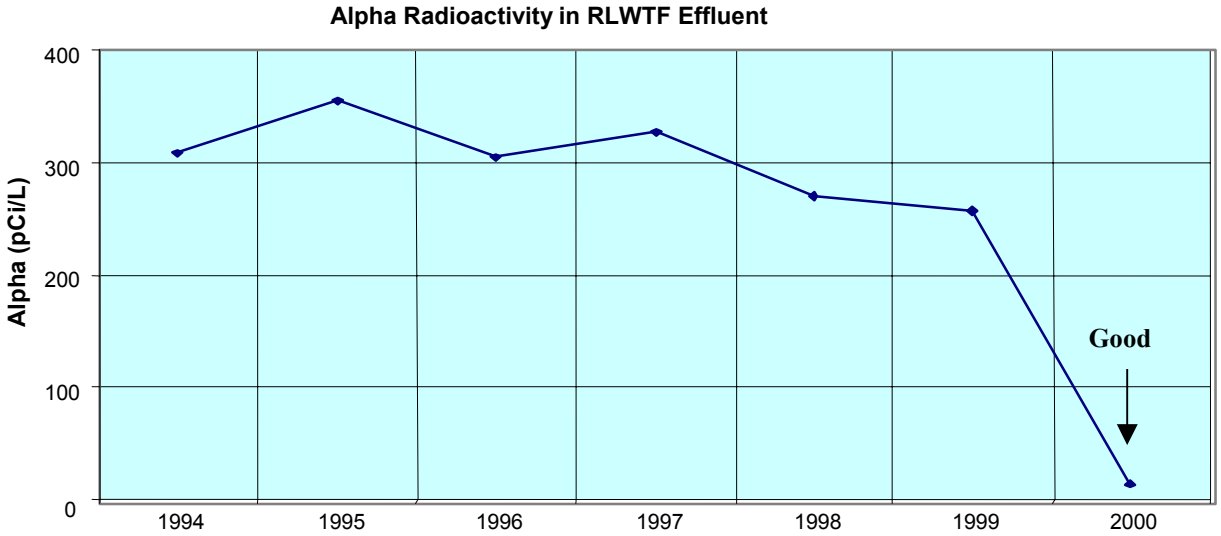


Figure 7-6. *Alpha radioactivity effluent concentrations were reduced from a high of 350 pCi/L to 13 pCi/L in 2000. This is an excellent reduction of 96%.*

7.2 Customer, Supplier, and Employee and Other Results

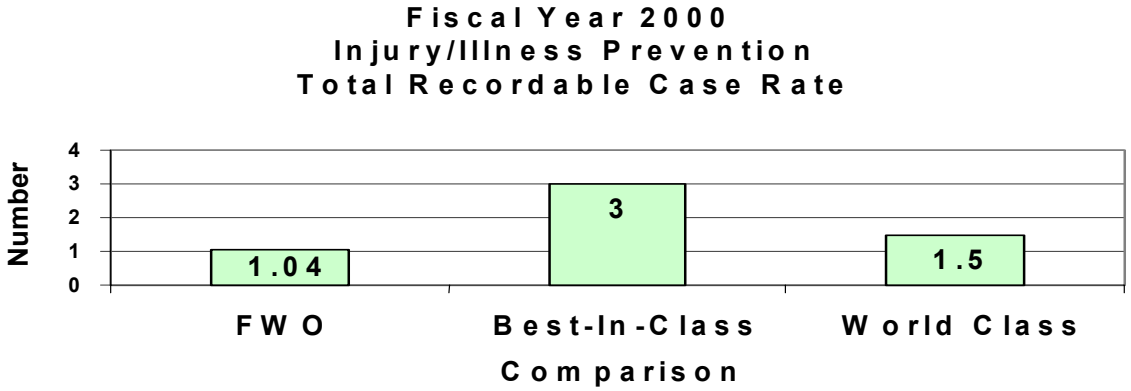


Figure 7-7. *FWO Total Recordable Case Rate for Fiscal Year 2000.*

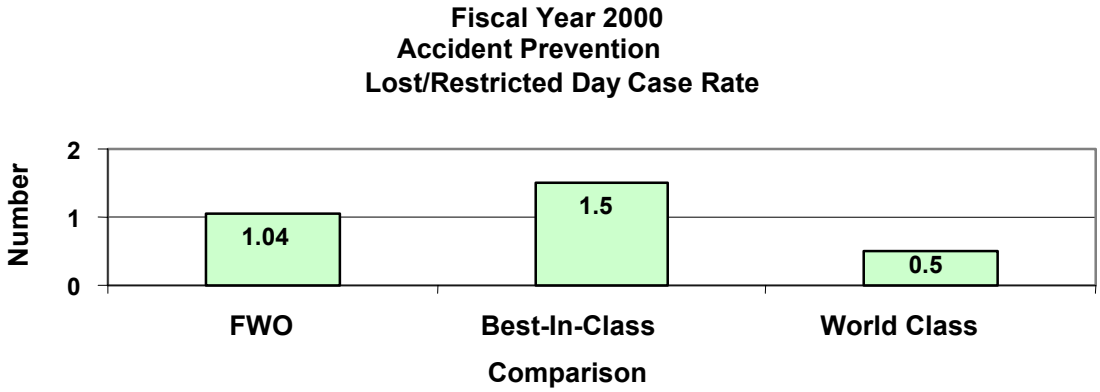


Figure 7-8. *FWO Lost/Restricted Day Case Rate for Fiscal Year 2000.*

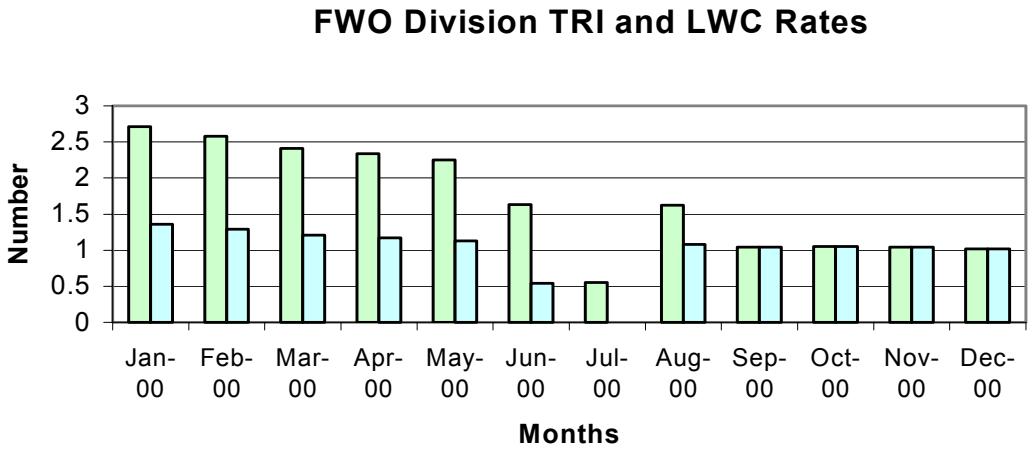


Figure 7-9. *FWO TRI and LWC Rates for Calendar Year 2000 (rolling 12-month average). Decline is shown from January 2000 to December 2000.*

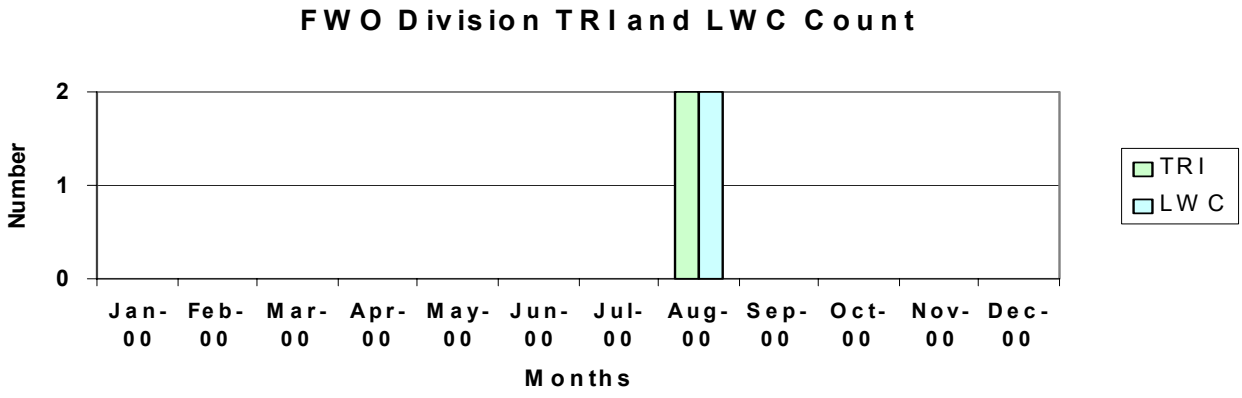


Figure 7-10. *FWO TRI and LWC Count for Calendar Year 2000 shows only one month had occurrences.*